

ACORN USER

£1.80

JUNE 1993

New 3D series

Add a new dimension to your programming skills

Topographer

Create real landscapes

Hands on

Readers' programs, helpful advice and more

Get in the picture

The ultimate challenge: we test five leading art packages

NEW USERS Look at the world behind the icon ● **REVIEWS** We test ProCAD, the professional drafting package ● Knowledge Organiser 2 sorts out your life ● 8Mb Ram upgrades ● Back to nature with CD-Roms ● **GAMES** Search for Thor's hammer in Heimdall ● Eat your heart out Sonic, here comes Zool! ● **EXCLUSIVE** Dominik Diamond looks at the Acorn games scene



ISSN 0263-7456



06>

SCSI systems

The complete

CD ROM Systems

Our CD ROM systems comprise of a Toshiba mechanism (Multisession - Photo CD compatible), a Morley SCSI card, a set of stereo speakers and four collections of discs to choose from (see below). The software on these discs is all RISC OS software and requires no use of a PC emulator whatsoever.

Collection 1 £649.00

(Grooves, Creepy Crawlies, Image Warehouse)

Collection 2 £729.00

(Grooves, Creepy Crawlies, Image Warehouse and Hutchinsons Encyclopedia)

Collection 3 £769.00

(Grooves, Creepy Crawlies, Image Warehouse and Dictionary of the living world)

Collection 4 £849.00

(Grooves, Creepy Crawlies, Image Warehouse, Hutchinsons Encyclopedia and Dictionary of the living world)

CD ROM Drive & SCSI Interface £489.00

Hard Disc Systems

The Morley Hard Disc systems comprise of a SCSI card together with all the necessary cables, SCSI management software, Hard Disc and a detailed manual. Effectively giving the user a 'plug in and go' solution to Hard Disc storage. Many of our existing customers have commented about how easy it was to connect their Morley Hard Disc to their computer.

External Hard Discs are housed in an attractive metal case with dual SCSI connectors and device ID switch already fitted. As with all of our SCSI cards CDFS is installed as standard.

A3000 or External 40Mb £349.00

A3000 or External 80Mb £499.00

A3000 or External 240Mb £709.00

A300/400/5000 Internal 40Mb £269.00

A300/400/5000 Internal 80Mb £449.00

A300/400/5000 Internal 240Mb £699.00

Syquest Hard Discs

Our removable Cartridge Hard Disc systems are designed to offer the end user the ultimate in terms of portable, mass storage. The systems come in a choice of either 42Mb or 88Mb sizes (non interchangeable). With the benefit of a small on-board cache the mechanisms offer superb performance with transfer rates exceeding that of many standard fixed hard discs.

The biggest advantage of these systems is that when a cartridge is full, you simply have to insert a new cartridge and you have another full 42Mb or 88Mb to play with.

All systems

42Mb system £499.00

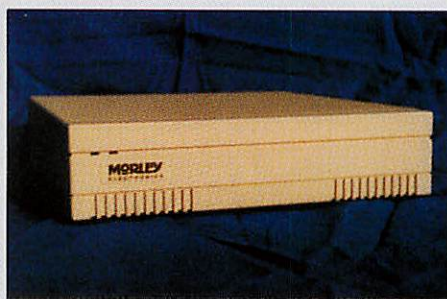
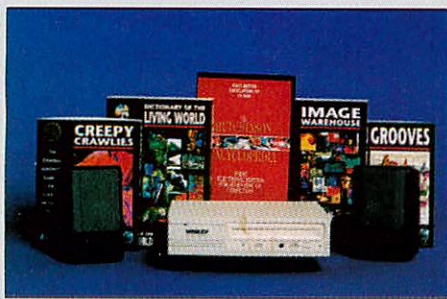
88Mb system £775.00

(Both include SCSI Interface & one cartridge)

Consumables

42Mb Cartridges £65.00

88Mb Cartridges £109.00



from Morley. solution.

Tape Archive

Tape archive systems tend to be regarded as expensive add ons to an Acorn system. The part that people tend to forget about is how valuable is their data? If you manage a network just think how much time and cost would be wasted if the hard disc failed without you having a recent back-up. Using standard floppy discs for back-up is one option but is incredibly tedious if large amounts of data are involved.

The answer is a Morley Tape Archive system. With every system sold we supply a FREE copy of SAS (Safe & Sound) archiving software to make backing up and restoring as simple as possible. Don't get caught out!

External 250Mb system **£799.00**
(Includes SCSI Interface & one 250Mb tape)

Consumables

250Mb Tapes **£24.99**
150Mb Tapes **£19.99**



Floptical® Systems

The new Floptical® system has been developed in the USA by Insite Peripherals of California while the drives are being manufactured by Matsushita of Japan (one of the worlds largest electronic manufacturers). 3M and Hitachi are currently producing the special 21Mb discs which give this incredible amount of storage. Morley have developed the drive for use on the Acorn range of RISC OS computers and this can now read and write standard 800k and 1.6Mb floppies as well as the 21Mb Floptical® discs. Using the 21Mb discs these drives are approximately twice as fast as normal floppy drives making them perfect for use as a backup system or general purpose program/data storage.

External 21Mb system **£499.00**
A5000 internal 21Mb system **£425.00**
(Both include SCSI Interface & one disc)

Consumables

21Mb disc each **£24.00**
Pack of 5 x 21Mb discs **£99.00**



Other Prices

RISC OS CD ROM DISCS

| | |
|--------------------------------------|----------------|
| Creepy Crawlies (MDI) | £99.00 |
| Grooves (MDI) | £59.00 |
| Image Warehouse (MDI) | £59.00 |
| Dictionary Of The Living World (MDI) | £175.00 |
| Hutchinsons Encyclopedia (PEP) | £99.00 |
| Woodland (APA) (Incl. free RUCD) | £150.00 |
| Frontier 2000 (CSH) | £175.00 |
| Revelation 2 (Longman Logotron) | £139.00 |
| British Birds (ILP) | £150.00 |

Other Products

| | |
|-------------------------------------|----------------|
| Morley Analogue & User I/F | £59.00 |
| Morley SCSI card (inc. CDFS) | £149.00 |
| Morley cached SCSI card (inc. CDFS) | £199.00 |
| CD Caddies | £6.50 |

Monitors

| | |
|------------------------------------|------------------|
| Microvitec CubScan 14" 0.28dp DMS | £399.00 |
| Microvitec AutoScan 20" 0.31dp DMS | £1,049.00 |

Please note that all prices exclude VAT and carriage. E & OE

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Subscriptions and back copies:
 (0483) 727762

Annual subscription rate:
 £22.95 including our exclusive monthly
 subscriber's disc

Reader services department:
 071-331 8022



Published by Redwood
 Publishing, a BBC Enterprises
 Company, 101 Bayham Street,
 London NW1 0AG. Tel: 071-
 331 8000. Fax: 071-331 8001.
 Typesetting and colour by
 Trumps Studio, Ware, Herts.

Printed by Cradley Print Ltd, West
 Midlands. Distributed by BBC Frontline,
 Park House, 117 Park Road, Peter-
 borough. © Redwood Publishing
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 registered trademark of Acorn
 Computers Ltd.

Redwood Publishing is a registered
 data user. ISSN 0263 7456.



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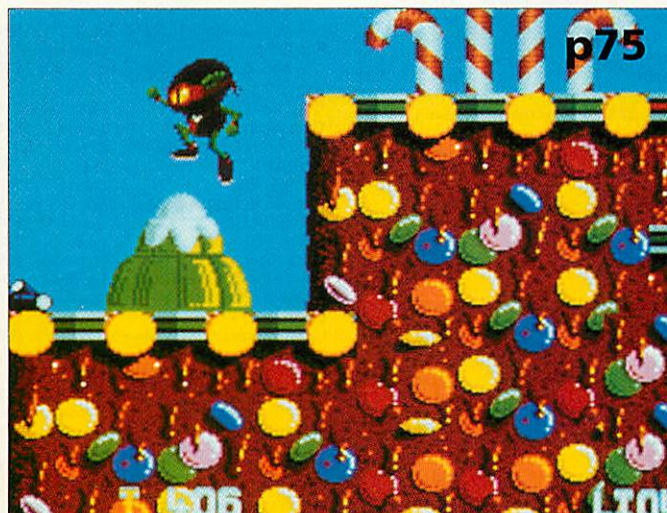
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EDITOR'S LETTER

Computer graphics has changed the popular perception of art. People who wouldn't be seen dead in front of an easel, have taken to this new form of creativity, thanks to the growing range of sophisticated graphics packages on the market.

Making your choice between vector graphics – found in packages such as *Artworks* – or the painting effects of the bitmap approach – with applications such as *Revelation Image Pro* or *ProArtisan 2* – is just one of the decisions to make when choosing a new art package.

In our round-up on page 15 we aim to show you what some leading Acorn packages are capable of. It's all a long way from the early days of *Artisan*, first reviewed in *Acorn User* in 1988.

Of course, the current state of Acorn art is by no means the end of the story: 24-bit colour is on the agenda, and Risc technology is working at the leading edge of graphics developments.

Last month's report from *Imagina* showed 64-bit Risc chips running at up to 150Mhz. This allows the kind of animation techniques found in today's film industry and makes Risc technology the name to watch in computer graphics.

Karen Drapay

Editor

EXCLUSIVELY PRODUCED ON ACORN MACHINES

All the editorial pages in *BBC Acorn User* are produced using Acorn computers, Computer Concepts' Impression 2, LaserDirect printers and Taxan monitors

SOFTWARE

10 out of 10
 – Early Essentials (-6), English (6-16), Maths Number (6-16) each £19
 – French, German, Italian, Junior Essentials, Maths Algebra, Science, Spanish each £POA
 1st Paint Resource £34
 1st Word Plus Manual Acorn v0 £10

3D Construction Kit (not OS 3.1) Domark £35

43000 Technical Reference Manual Acorn v0 £30
 A4 Technical Reference Manual Acorn v0 £65
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 ABC Version 3 Oak £79
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MAY 1993

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| Presenter GTI | Lingenuity | £66 |
| PrimeArt | Minerva | £69 |
| PrimeMover | Minerva | £POA |
| PrimeWord | Minerva | £54 |

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| Printer Drivers, RISC OS: | | |
| BJ-10ex / BJ-200 TurboDriver + Cable | CC | £42 |
| BJC-800 TurboDriver + Cable | CC | £89 |
| Canon BubbleJet, Canon LBP, | | |
| Canon PJ1080, ColourCel, Epson JX, | | |
| Epson ESC-P2, HP, Integrex 132 | | |
| - each | Ace | £19 |
| Deskjet 500C, Epson / Star colour | - each | RISC |
| ProDrivers: Canon LBP8, Epson ESC-P2, | | |
| HP Colourjet | - each | Ace |
| ProArtisan | Clares | £71 |
| ProArtisan 2 | Clares | £POA |
| ProCAD | Minerva | £394 |

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| Programming in ANSI Standard C | | |
| on the Archimedes | Sigma | vo £15 |
| Prophet (requires 2 Mb) | Apricote | £132 |
| Prophet Demo | Apricote | £10 |
| Protext | Amor | £117 |
| Provocator | Computer Tutorial | £15 |

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| Puncman 1 and 2 | Chalksoft | £16 |
| Puncman 3 and 4 | Chalksoft | £16 |
| Puncman 5 to 7 | Chalksoft | £18 |
| Punctuate | Xavier | £31 |
| Punctuate! | Topologika | £25 |
| Purchase Ledger | Minerva | £78 |

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| Quest for Gold | Krisalis | £19 |
| QuickKey | ICS | £10 |
| - site licence | | £30 |

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| Real McCoy 2 | Fourth Dim | £25 |
| Real McCoy 3 | Fourth Dim | £25 |
| Real McCoy 4 | Fourth Dim | £25 |
| Recall, age 8-13 | Sherston | £39 |
| Redshift | Minerva | £10 |
| Render Bender 2 | Clares | £78 |
| Reporter | Minerva | £29 |
| Repton 3 | Superior | £14 |
| Resultz | Colton | £POA |
| Revelation 1 | Longman | £39 |
| Revelation 2 | Longman | £75 |
| Revelation 2 CD Rom | Longman | £98 |
| Revelation ImagePro | Longman | £127 |
| Reversals | Chalksoft | £17 |
| Rhapsody 2 | Clares | £45 |

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| Rhapsody 3 | Clares | £79 |
| Rhythm-Bed | Clares | £39 |
| RiscBASIC Compiler | Silicon | £79 |
| RiscForth Compiler | Silicon | £79 |
| Risc OS Companion Vol 1 | Oak | vo £49 |
| Risc OS Extras 1992 | Acorn | £9 |
| Risc OS Programmer's | | |
| Reference Manual | Acorn | vo £79 |
| Risc OS Style Guide | Acorn | vo £11 |
| RoboLogo | Silicon | £39 |
| Round the World Yacht Race, age 9+ | Storm | £27 |

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| Sales Ledger | Minerva | £78 |
| Saloon Cars Deluxe | Fourth Dim | £25 |
| - Deluxe Extra Courses | Fourth Dim | £16 |
| S-Base Developer | Longman | £175 |
| S-Base Developer Plus | Longman | £275 |

S-Base Personal

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| Schema | Longman | £89 |
| Schema 2 | Clares | £95 |
| Science, drawfiles | £POA | |
| Score Draw | Micro Studio | £25 |
| Scorewriter | Clares | £44 |
| - PMS Dot matrix, Version 1 | EMR | £127 |
| - PMS Dot matrix, Version 2 | | £147 |
| - PMS PostScript | | £422 |
| ScreenPlay | Widgit | £35 |
| ScreenTurtle | Topologika | £44 |
| Search and Rescue, age 9+ | Storm | £27 |
| Seashore Guide, drawfiles | Micro Studio | £16 |
| Seelinks - Ourselves, KS1.2 | ESM | £29 |
| Seelinks - Pond Watch, KS2 | ESM | £37 |
| Seelinks - Transport, KS2 | ESM | £37 |

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| Sesame Street | Electric Crayon | £106 |
| - Letters for You | | £16 |
| - Numbers Count | | £16 |
| ShapeFX | Data Store | £10 |
| ShareHolder | Silicon | £106 |
| ShareHolder Professional | Silicon | £234 |
| Shylock Gnomes, age 10-15 | Selective | £16 |

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| SkyHunter | Krisalis | £24 |
| smArt | Longman | £22 |
| smArt Aliens, Animals, Dinosaurs, Egypt, | 4maton | £50 |
| Faces*, Fantasy, Fashion, Fiddles & | | |
| Drums, Heraldry, Homes*, Leisure*, Look | | |
| Smart, Smartoons, Trees and Gardens | | |
| *Please specify English, French, German, | | |
| Spanish or Welsh - each | 4maton | £15 |
| smArtFilter | 4maton | £32 |
| smArt Modern Languages | 4maton | £19 |
| Smudge the Spaniel, age 4-8 | Storm | £20 |
| Snippet (new version) | 4maton | £32 |
| Soapbox | Xavier | £34 |
| SolidCAD | Silicon | £79 |
| SolidsRender | Silicon | £79 |
| SolidTools | Silicon | £234 |
| Sound Engineer | EMR | £69 |
| Sound FX Maker | CIS | £31 |
| Sounds & Rhymes | Xavier | £29 |
| Spark | David Pilling | £5 |
| SparkFS | David Pilling | £20 |
| Sparkle | Morley | £59 |
| Special | ICS | £10 |
| - site licence | | £30 |

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| Spelling week-by-week | Chalksoft | £21 |
| Spheres of Chaos | ExpLAN | £98 |
| Splash, age 7-11 | Matt Black | £19 |
| Splice | Sherston | £19 |
| Split an Image | Ace | £29 |
| Spoken Word | Sherston | £15 |
| | Wyddia | £16 |

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| Spooler | Computer Tutorial | £9 |
| Sporting Triangles | CDS | £19 |
| SportsDay | Selective | £22 |
| SportsPeople | Selective | £22 |
| SpriteEd | Computer Tutorial | £17 |
| SpySnatcher | Topologika | £12 |
| Square Route | Computer Eyes | £16 |
| Starspell Plus | Fisher-Marriott | £19 |
| StartWrite | Icon | £55 |
| Stock Management | Minerva | £78 |
| StockPack | Topologika | £37 |
| StrongED | Stallion | £22 |
| Studio24Plus Version 2, age 11+ | EMR | £149 |
| Studio24Plus Version 3, age 12+ | EMR | £210 |
| SUMthing | Resource | £19 |
| SuperDump | Silicon | £20 |
| Superior Golf | Superior | £14 |
| SuperPlot | Silicon | £20 |
| Supersounds | CIS | £15 |
| Supersounds 2 | CIS | £15 |
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| System Delta Plus II | Minerva | £50 |
| - Reference Guide | Minerva | vo £25 |

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| Talisman | Minerva | £8 |
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| Target Maths | Triple R | £15 |
| Technodream (Nevryon 2) | Superior | £20 |
| TechWriter | Icon | £159 |
| Thinklink | Xavier | £29 |
| ThinkSheet | Fisher-Marriott | £38 |
| Thundermonk | Minerva | £11 |
| Tiles | Brain Games | £16 |
| Timeshare | Fisher-Marriott | £19 |
| Timetabler | Minerva | £549 |
| Time Traveller, KS2 | ESM | £37 |
| - Britain Since the 1930s, KS2 | | £32 |
| - The Victorians, KS2 | | £32 |
| TinyLogo/Draw | Topologika | £34 |
| TinyPuzzle | Topologika | £24 |
| Titler | Clares | £119 |
| Toolkit Plus | Clares | £36 |
| Tools Graphics, drawfiles | Micro Studio | £23 |
| Topographer | Clares | £67 |
| Touch Type | Iota | £39 |
| Tower of Babel | Cygnus | £17 |
| Trace | David Pilling | £5 |
| Tracer | Midnight | £46 |
| Tracker | Leading Edge | £37 |
| Transport, drawfiles | Micro Studio | £25 |
| Turbo Type | CIS | £20 |
| Tween | Ace | £28 |
| Twin | Acorn | £24 |
| Twin World | UBI Soft | £14 |
| TWO (Task and Window Organiser) ICS | | £10 |
| - site licence | | £30 |
| TypeStudio | RISC | £39 |

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| Utility Disc 1 | Data Store | £8 |
| Utility Disc 2 | Data Store | £13 |
| Utility Disc 3 | Data Store | £7 |
| Utility Collection | Data Store | £21 |

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| Vector | 4maton | £75 |
| View»Mac 3 | Human | £65 |
| - Arc/Mac Cable | Human | £24 |
| Viewpoints, age 7-12 | Sherston | £37 |
| Vox Box | Clares | £46 |

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| Waterloo (not OS 3.1) | Turcan | £19 |
| Whale Facts | Topologika | £34 |
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| Word Bank | Topologika | £25 |
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| Yacht 2 | Computer Tutorial | £49 |
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| Zarch | Superior | £14 |
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| Resource | £19 |
| Silicon | £20 |
| Superior | £14 |
| Silicon | £20 |
| CIS | £15 |
| CIS | £15 |
| Krisalis | £19 |
| Minerva | £50 |
| Minerva | vo £25 |
| ExpLAN | £95 |
| Minerva | £8 |
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| Triple R | £15 |
| Superior | £20 |
| Icon | £159 |
| Xavier | £29 |
| Fisher-Marriott | £38 |
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| Computer Tutorial | £94 |
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| Micro Power | £15 |
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| Computer Tutorial | £94 |
| Superior | £14 |
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| A310 4 Mb soldered + MEMC1a | IFEL | £180 |
| - as above + fitting | | £210 |
| A5000 2-4 Mb Non-upgradable | Atomwide | £85 |
| A5000 2-4 Mb Upgradable | Atomwide | £99 |
| A5000 2-8 Mb including fitting | Atomwide | £500 |
| A5000 4-8 Mb including fitting | Atomwide | £391 |
| A540 4 Mb | Acorn | £253 |

COMPUTERS...

A3010 1MB FD Family Solution

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| Family Solution + | Acorn | £420 |
| ideaA | | |
| Special price when you buy an A3010 with an ICS internal hard disc upgrade: | | |
| - Family Solution + 20 Mb hard disc | | £599 |
| - Family Solution + 60 Mb hard disc | | £675 |
| - Family Solution + 80 Mb hard disc | | £715 |
| - Family Solution + 120 Mb hard disc | | £799 |

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|--|-------|-------|
| A3010 2MB FD Learning Curve with Monitor | Acorn | £675 |
| - as above + JP150 Printer | | £889 |
| A3020 2MB FD | Acorn | £749 |
| A3020 2MB HD60 | Acorn | £899 |
| A4 2MB FD | Acorn | £1395 |
| A4 4MB HD60 | Acorn | £1695 |

A4 4MB HD80

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| £1699 | | |
| A4 4MB HD120 | Acorn | £1799 |
| A4 Extra Battery Pack | Acorn | £50 |
| A4 Shoulder Bag | Acorn | £35 |
| A4000 2MB HD80 | Acorn | £945 |
| — as above + Home Office | | £995 |
| A5000 2MB HD80 Multiscan | Acorn | £1395 |
| — as above + Learning Curve | | £1455 |
| Pocket Book | Acorn | £212 |

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I²C PRODUCTS...

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| AnDi Oddule | Balidon | £39 |
| I²C Adaptor (needed unless you already have an I²C socket) | Balidon | £10 |
| I²C SWI (enhanced IIC_Control) | Balidon | £15 |
| - bought with Oddule | | £5 |

PRINTERS...

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| ArcLaser 300-6 | Calligraph | £895 |
| ArcServer 300-8 | Calligraph | £985 |
| Bubble Jet BJ-10ex | Canon | £187 |
| Bubble Jet BJ-10ex + TurboDriver | Canon/CC | £219 |
| Bubble Jet BJ-20 | Canon | £255 |
| Bubble Jet BJ-200 | Canon | £282 |
| Bubble Jet BJ-300 | Canon | £325 |
| Bubble Jet BJ-330 | Canon | £405 |

Bubble Jet **BJC-800+Turbo-Driver** Canon/CC **£1374**

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| DeskJet 500 | Hewlett-Packard | £299 |
| DeskJet 500C | Hewlett-Packard | £375 |
| DeskJet 550C | Hewlett-Packard | £475 |
| Laser Direct HiRes4 | CC | £899 |
| - 250-sheet Paper Cassette | | £99 |
| Laser Direct HiRes8 | CC | £1275 |
| Laser Direct HiRes Board | CC | £325 |
| Refill toner cartridge for Canon EPS | | £50 |
| New toner cartridge for Canon LBP-4 | | £59 |

SCANNERS, DIGITISERS...

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| ArcScanner including Epson GT-4000 | | |
| Colour Converter | Clares | £1660 |
| FaxScan | Lindis | £145 |
| Handipad | Spacetech | £94 |
| Hawk V9 | TechSoft | £173 |
| - A3000 version | Wild Vision | £199 |
| Hawk V9 MkII | Wild Vision | £278 |
| HiVision Digitiser Colour | Wild Vision | £259 |
| - A3000 External | HCCS | £137 |
| - A3000 Series / A4000 Internal | | £124 |
| - A5000 / 300 / 400 | | £124 |
| - Upgrade from Vision | | £45 |
| iImage (Sharp JX-100) | Irlam | |
| - for A5000 | | £490 |
| - for other computers | | £589 |
| Image Scanner | Iola | £383 |
| - Colour Upgrade Kit | Iola | £239 |
| - Fast Parallel Card | Iola | £98 |
| i-Scan 200 | Irlam | £539 |
| i-Scan 400 | Irlam | £589 |
| Pineapple Colour Video Digitiser | | |
| - A3000 boxed | Pineapple | £195 |
| Prolmage (Epson GT6000) | Pineapple | £230 |
| - for A5000 | Irlam | £989 |
| - for other computers | | £1089 |
| Scan-Light A4 | CC | £277 |
| - with Sheet Feeder | CC | £360 |
| Scan-Light 256 | CC | £190 |
| - A3000 internal | CC | £190 |
| Scan-Light Professional | CC | £565 |
| - as above + SCSI interface | CC | £699 |
| SnapShot Colour Video Digitiser | | |
| - A3000 version | Lingenuity | £195 |
| Spectra | Lingenuity | £275 |
| - Archimedes / A5000 | RISC | £545 |
| - A3000 Series / A4000 Internal | | £545 |
| - A3000 External | | £555 |
| Vision Digitiser | HCCS | |
| - A5000 / 300 / 400 Mono | | £48 |
| - A5000 / 300 / 400 Colour | | £76 |
| - A3000 External Mono | | £60 |
| - A3000 External Colour | | £89 |
| - A3000 Series / A4000 Internal Mono | | £48 |
| - A3000 Series / A4000 Internal Colour | | £76 |

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ACORN KILLS OFF BBC MASTER 128

AFTER more than seven years, Acorn is to cease production of its last eight-bit computer, the Master 128.

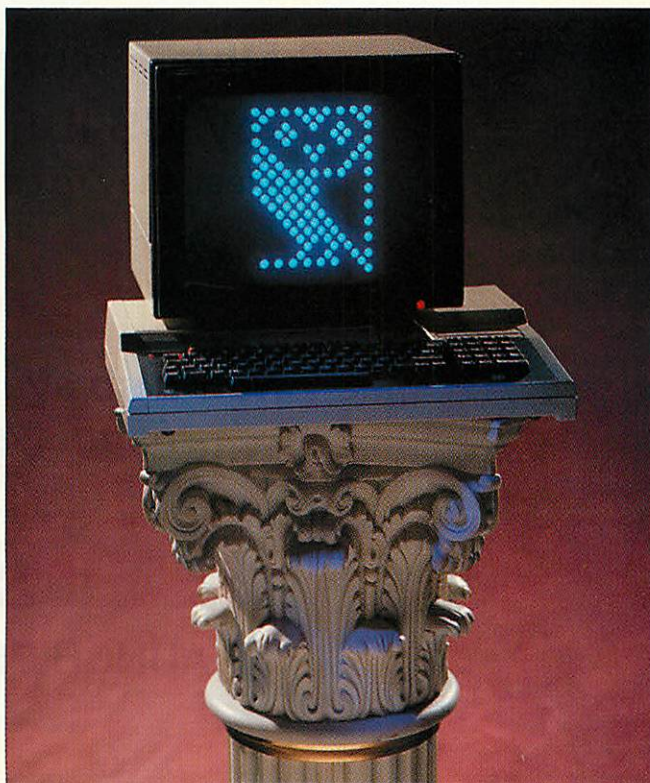
Although there is still a steady, if small, demand for the Master 128, Acorn says that the machine is now uneconomical to produce and that key components are now becoming scarce.

The demise of the BBC Master brings an end to the illustrious eleven-year story of the BBC Micro. During this time, over a million derivatives were built and sold all over the world.

Long after the arrival of the Archimedes, people still wanted the Master 128 because of its competitive price, the range of standard interfaces, BBC Basic and the sturdiness of the machine.

History may reveal that the Master 128 kept Acorn afloat while the company tried to re-establish itself with the new and unproven Archimedes.

But, as Acorn's marketing director, Mike O'Riordan, pointed out, the Beeb is far from dead. 'The Master has contributed greatly to Acorn's



The Master 128 bows out after a seven-year run

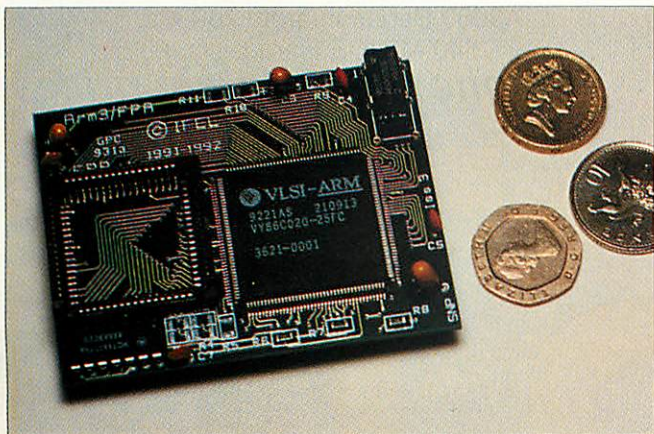
success and will continue to be used for key applications within the classroom for many years,' he said. O'Riordan

added that Acorn will continue to provide spare parts for the Master 128 for at least five more years.

FPA FLOATS THIS WAY

THE Floating Point Accelerator could arrive by the end of June. GEC Plessey Semiconductors is at an advanced stage of production. The FPA chip will boost the performance of many maths-intensive programs at present performed by

the Risc OS Floating Point Emulator. Several manufacturers, such as Ifel and Simtec, have been selling Arm3 upgrades with empty sockets ready for the FPA. Certain Archimedes, like the A5000 have FPA sockets as well.



The hole in this Arm3 upgrade could soon be filled by the FPA chip

HCCS REFIT

POTENTIAL buyers for the Ultimate Expansion System from HCCS can be put off if they own A3000 or A3010 computers. The space in these models may already be taken up by an IDE hard drive.

To counter this, HCCS has come up with a service to remove and refit these hard drives to the Ultimate Expansion System unit. The new unit will then be fitted into the customer's machine.

Most makes of drive except HCCS's own Diamond brand will require re-formatting, so data will have to be backed-up before the refit takes place.

HCCS reports that its Ultimate Expansion Trade-up scheme has already been taken on by a selection of Acorn dealers. For more details on the deal give HCCS a call on 091-487 0760.

IN BRIEF

● Beebug has published an eight-page pamphlet aimed at people who want to get to grips with Econet networking over Ethernet networks, otherwise known as the Acorn Universal Network system. The pamphlet is called *An Introduction to Networking* and covers topics like extending established networks, starting new installations and hardware/software familiarisation. The pamphlet is available free of charge from Beebug.

● The latest edition of Beebug's full-colour Product Guide brochure has been published, featuring brief descriptions of over 2500 selected product lines. The Beebug Product Guide is free of charge from Beebug on request. For more information contact Beebug on (0727) 840303.

● Andrew Timms, the 14-year-old *Acorn User* reader who launched the Children's *Acorn User Club* late last year, has decided to make a go of marketing his own Archimedes applications. Andrew says his first commercial title will be *ModSys*, short for Module System.

This is a utility for incorporating short, user-written, desktop utilities into a master control application. Andrew thinks he will charge between £5 to £10 for *ModSys* when it is finished. 'I'm not desperate for a profit, I just want to write useful applications,' Andrew said. For more information, contact Andrew Timms at 109 Woodland Drive, Cassiobury, Watford, WD1 3DA.

● Longman Logotron has launched *Talking Pendown*, the speaking version of its popular schools-oriented word processor. *Talking Pendown* is entirely software-controlled and the speech facility can be switched on and off as desired. Longman expects the package to be useful for users of all ages and abilities, but especially users with below average reading levels and dyslexics. *Talking Pendown* is £64 but registered Pendown users can upgrade for half price. Discounts for site licence holders are also available. Contact Longman Logotron on (0223) 425558.

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RISC OS 3
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SUCCESS STORY OF SPRING SHOW

THE first *Acorn User* Spring Show held recently at Harrogate was declared a success by event organiser Geoff Potter of Safesell Exhibitions. Fifty exhibitors attracted 5,000 visitors over the three-day event and next year's show looks set to be bigger still.

Exhibitor feedback was extremely positive after the show. Computer Concepts told us the long journey north was well worth the trip.

Rob MacMillan from Colton Software admitted he wasn't entirely convinced the show



Crowds enjoy the Acorn User Show at Harrogate

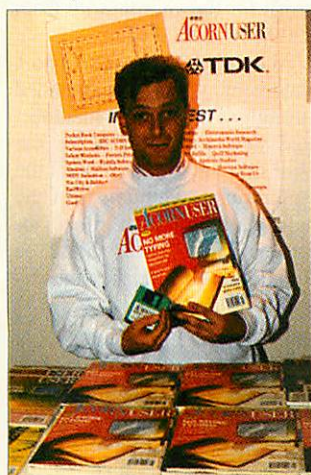
was going to be a big success, but on the day his worries proved unfounded.

'We'd definitely like to be there again next year,' he said. Several other exhibitors were forced to make special trips back to base for extra stock.

Special events hallmarked the show. Dominik Diamond, presenter of hit Channel 4 computer game show *GamesMaster*, toured on Friday to the delight of games fans.

● The next major Acorn show will be Acorn World '93, to be held at the Wembley Exhibition Centre from 29 to 31 October. *BBC Acorn User* is sponsoring the show, which looks like it will be the biggest Acorn show ever staged.

The initial response has been so overwhelming that additional space has had to be booked at Wembley to accommodate the number of anticipated exhibits.



The smiling face of Acorn User

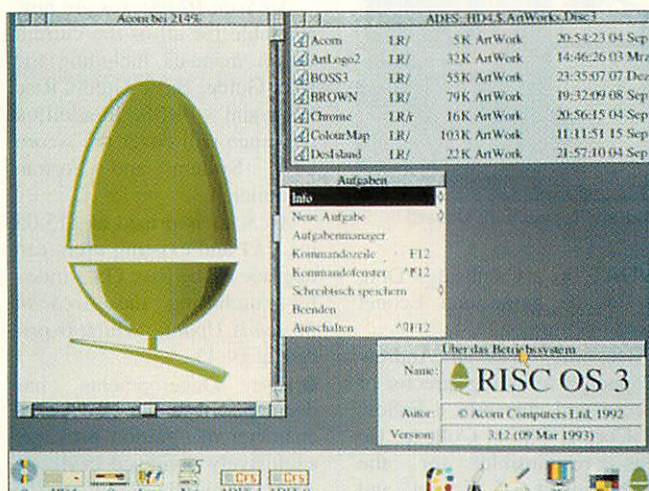
ACORN TARGETS GERMAN MARKET

ACORN had an impressive presence at this year's huge CeBIT information technology exhibition in Hannover.

CeBIT attracted 660,000 visitors this year, and Bob Coates, Acorn's general manager, headed up the stand team with managing director Sam Wauchope. According to Coates, Acorn sees great potential in the German market.

'The existing German market leaders are in a bit of a mess right now,' said Coates. 'Commodore and especially Atari are failing to maintain their customer support. Developers are becoming increasingly disillusioned and so they are looking for new platforms. Many have come over to our stand and were very impressed with what we had to show them.'

The highlight for Acorn was the unveiling of an enhanced



The German-language version of Risc OS 3.12

German-language version of Risc OS 3. The new version of the operating system is release number 3.12 and incorporates Acorn's new stylish 3D window sprites plus an option to replace standard system font on the iconbar and menus with

outline fonts. The go-ahead was given because German system messages and menu items forced Acorn to use larger fonts.

Acorn is not able to say when Risc OS 3.12 will be released in English.

IN BRIEF

● Minerva showed its new *ProCAD* drafting package at the recent CadCam Show at the Birmingham NEC. Orders were taken from a variety of customers, from British Steel to the Ministry of Defence. Minerva is also exploring the avenue of marketing *ProCAD* as part of a complete Cad system.

● The tragic death of programmer Ricky Delarre in a motorbike accident has forced Clares to delay the release of its new mapping program, *Topographer* (reviewed on page 52). Colleague Ian Robinson has taken on the task of completing *Topographer*.

● Arm chips are to be used in more Newton PDA related products. Motorola, Matsushita and Siemens have all won licences to develop Newton-compatible products. It was also announced that another chip maker, Cirrus Logic, will work with Apple and Arm Ltd to develop support chips. At the CeBIT show, Siemens and Apple demonstrated a docking station which enables a Newton to make telephone calls and send fax messages. Sharp, the third licensed manufacturer of Arm chips, also showed its prototype Newton-compatible.

● More Tesco Computers For Schools vouchers are up for grabs. Children hoping to earn their schools some new Acorn equipment are invited to enter a competition sponsored by the *DJ Kat Show* on Sky One. All they have to do is create a meal or picnic for DJ, in the form of a collage, painting or 3D model. Entries must be received by 26 May. Please send them to Computers For Schools, *DJ Kat Show*, PO Box 24, Isleworth, Middlesex, TW7 5QJ. The winner, to be announced on 8 June, will receive all the vouchers a mystery celebrity manages to grab from a specially designed wind machine. The scheme has been such a success this year that schools throughout the UK have been given three extra weeks, until 13 June, to collect vouchers. Last year the scheme ran for eight weeks, but this year the extension brings it to 15 weeks. The closing date for the receipt of the vouchers and order forms remains at 2 July.

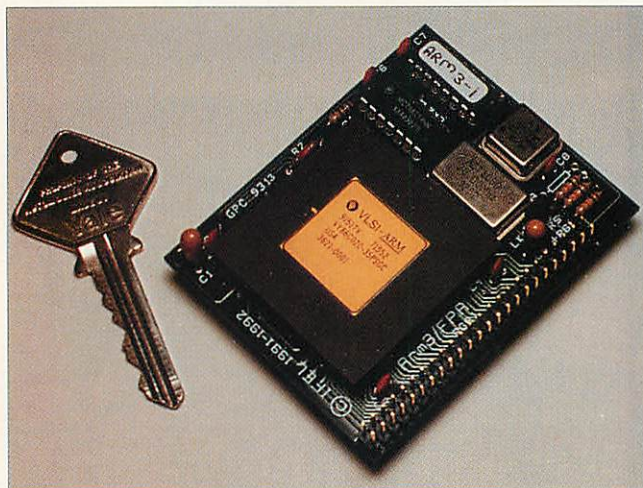
IFEL ULTRA-FAST ARM3 UPGRADE

IFEL showed an ultra-fast Arm3 upgrade at the *Acorn User Spring Show*.

Like Ifel's existing Arm3 upgrades, the new device combines an Arm3 processor with the option of adding the floating point accelerator when it is released. The difference is that Ifel intends to offer the much faster 35MHz Arm3.

At 35MHz an Arm3 gives, typically, 15% better performance than a 25MHz part. However, it is unlikely that the FPA chips will operate reliably at the 35MHz clock rate, so a small switch is provided to select between 25MHz and 35MHz clock crystals.

Another problem is that the 35MHz Arm3 comes in a heavy-duty ceramic PGA chip package instead of the compact surface-mounted form of the standard Arm3. If it goes into production, the 35MHz Arm3 upgrade will only be available for 300, 400 or R140



Ifel's bigger and faster 35MHz Arm3 upgrade

series Archimedes because of space limitations.

At first it was assumed that few of the 35MHz Arm3 parts had been made. It is now clear that though the supply is finite there will be roughly 1500 of these available. Ifel has not yet decided whether it will put the

35MHz Arm3 with FPA into production – it depends on whether customers are sufficiently enthusiastic to make it worthwhile.

The target price Ifel has set is £199 inc VAT. For further information contact Ifel on (0752) 847286.

ACORN RESULTS

ENCOURAGING financial results to 31 December 1992 have been revealed by Acorn. At the same time Acorn's chairman Ernesto Musumeci has been painting a rosy picture of Acorn's prospects in the 1993 financial year.

Turnover rose from £40.9M to £48.2M, an increase of almost 18% during a period in which most other computer manufacturers have been struggling. Operating profit was up by 40% to £1.53M. Net profit for the year was up from £300,000 to £1.3M.

According to the chairman's statement, Acorn maintained strong margins. Musumeci said new technology like the VidC20 video chip and the continuing development of the new Arm700 Risc processor by Arm Ltd. These could be foundations of the next-generation Archimedes.

PINEAPPLE LINK-UP

A **NEW** connector is able to link the most recent Acorn machines to both the Pineapple video digitiser and future Pineapple hardware.

Pineapple's Mini Expansion Adapter/2 (MEA/2) is aimed at the A3010, A3020 and A4000.

Other A3000-compatible external modules like scanners and cards, should also work.

The device almost duplicates the A3000 external expansion interface. The main difference is that the new bus is eight bits wide compared to the original's 16-bit bus. Pineapple says this affects very few peripherals.

Pineapple is also to renew production of its Archimedes RGB-to-Pal video coder, due to unexpected public demand. The coder was originally wound down in readiness for the new genlock card.

The composite video version of the PLC/2 is £69 + VAT; the S-VHS version is £10 extra. The MEA/2 interface is £28 + VAT. Call Pineapple on 081-599 1476.

HOPPER TO OLIVETTI



Andrew Hopper joins Olivetti

WHAT do a Cambridge Don, an arcade game and Econet have in common?

The answer is Dr Andrew Hopper, a founding director of Acorn and currently a Fellow of Corpus Christi College. He was responsible for the development of Econet and provided the inspiration for a game called *Hopper*.

This month he celebrates his appointment as head of Olivetti's corporate research. Although Hopper has not been on the Acorn payroll for some time, he has retained close links with Acorn.

RISC DEVELOPMENTS ROUND-UP

THE latest addition to the *ArcScan III* index system is the Risc OS 3 Programmers' Reference Manual.

ArcScan III indexes are now available for all of the current Acorn manuals including the User Guide, Basic Guide, Risc OS 2 and 3 PRMs. In addition the range will cover the Acorn DDE System and Fortran compiler.

ArcScan is priced at £15.05 inc VAT and existing users can upgrade to the Risc OS 3 index by purchasing the *ArcScan Manuals Update*, which is priced at £4.45.

● Risc Developments has decided to call its optical character recognition package, exclusively reviewed in *Acorn User* last month, *Sleuth*.

The package is designed to 'read' and then to translate into plain Ascii, pages of text which have been scanned in either by an image scanner or a fax machine. The price of *Sleuth* has been confirmed by Risc Developments at £49+VAT.

● A revised edition of the book *Wimp Programming for All* has been published by Risc Developments.

Additions to the book, which is a detailed introduction and tutorial to programming Risc OS compliant applications in Basic relate to the arrival of Risc OS 3.1. Previously the book concentrated on Risc OS 2, and only covered Risc OS 3 briefly.

To complement the book, a £4.95 supplementary examples disc is also available.

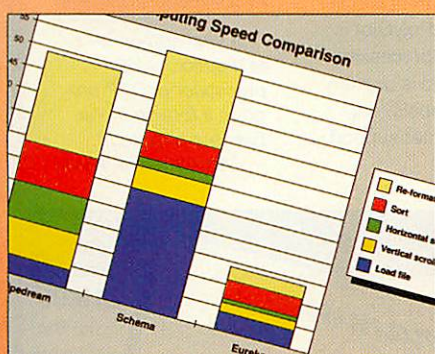
● *Wimp Programmer's Toolkit* is Risc Developments' suite of a dozen Risc OS Wimp development programs.

It has now been bumped up to include the latest version of Acorn's template editor *FormEd* version 1.26.

The *Wimp Programmer's Toolkit* is priced at £19.95 and existing users can upgrade to it by returning their original disc with £2 to cover post and handling.

Risc Developments can be contacted on (0727) 840303

THE AWARD-WINNING EUREKA!



'Eureka will immediately become my first choice of spreadsheet: it will be a tool I use everyday.'

Graham Bell, Acorn User

'Eureka has the edge for speed over its rivals'

Clem Vogler, Acorn Computing

'Eureka does for numbers what Impression does for words. A highly polished and powerful spreadsheet'

James Hope, Computer Shopper

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Eureka — £119 for Single User version
£400 Educational Site Licence
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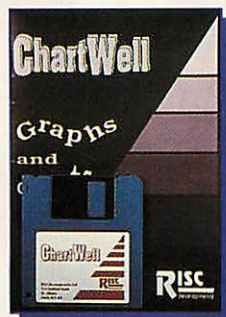
124 Cambridge Science Park, Milton Road, Cambridge CB4 4ZS
Tel: (0223) 425558 Fax: (0223) 425349

ChartWell

£29.95

inc. Vat
+ £2 p&p

ChartWell is a comprehensive but easy-to-use chart and graph package. From data dragged to it, ChartWell will produce a variety of both horizontal and vertical bar charts, pie charts, line graphs, scatter graphs and polar plots. ChartWell interprets data with the minimum of intervention from the user, but also allows detailed control over all features as and when required. Output is in standard Draw file format. Flexible data selection allows up to six data sets to be chosen from as many as 32 different sets, for display in any order. All graph characteristics can be saved to reproduce the same style of graph with ease as required.



"ChartWell scores on simpler controls over the basic graph types. It also has enough effects to present material prettily, at a price that makes it attractive to the home or school user."

BBC Acorn User

Polyglot

£19.95

inc. Vat
+ £2 p&p

PolyGlot is a highly flexible package which can be readily customised to suit the needs of the user. Primarily of interest to users of foreign languages, PolyGlot provides quick and convenient access to all the characters not normally found on the keyboard from simple user defined windows. PolyGlot is ideal for use with word processing and DTP packages, and is useful for other groups of symbols (e.g. mathematical). Full printer support is included.



"...a vital add-on for a text editor, word processor or DTP program if foreign alphabets are required."

Archimedes World

DeskEdit 2

£31.95

inc. Vat
+ £2p&p

DeskEdit 2 is probably the most comprehensive editor available for the Archimedes range with extensive features for editing ASCII text, Basic, C or other programming languages. There are numerous options, with many keyboard shortcuts for the more experienced user. By automatically handling text and Basic programs, DeskEdit 2 provides you with all the text editing facilities you will need in a single package.



"DeskEdit 2 has far more in the way of text editing facilities and a remarkably comprehensive list of features to support Basic and C programmers - indeed it is difficult to think of anything that could be added."

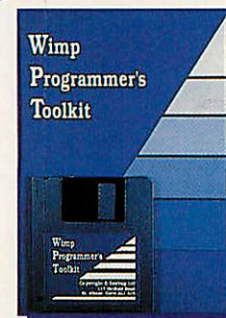
Archimedes World

Wimp Programmer's Toolkit

£19.95

inc. Vat
+ £2 p&p

This is a collection of 12 multi-tasking applications to assist in the development and debugging of Wimp programs, particularly in Basic. Window design (using FormEd) and Menu design are both catered for, with other applications to monitor the Wimp and provide all the debugging information you need. The Wimp programmer's Toolkit comes complete with three different Wimp shell programs - just plug in your own code and go.



An ideal companion to the book Wimp Programming for All.

File Handling for All by David Spencer and Mike Williams

£9.95

Disc
£4.95
+ £2 p&p

This book covers in some detail all the principles and techniques required to program file handling applications from simple card index files, to multi-file databases with file and record pointers and indexing. There are copious programming examples, all written in Basic, and this book provides an ideal introduction and development of the subject for programmers concerned with file handling applications. The accompanying disc contains all the example programs from the book plus a complete working database system.



"This is a useful, well written book, benefiting from the obvious experience of its authors, both in the field of programming and the publishing world."

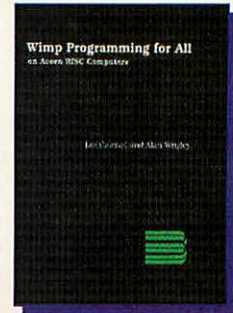
Micro User

Wimp Programming for All by Lee Calcraft and Alan Wrigley

£12.95

Disc
£4.95
+ £2 p&p

This book provides a comprehensive introduction to the many details involved in writing Wimp programs on the Archimedes, dealing with the Wimp poll loop, windows, icons, menus, file transfers, outline fonts, printing and more. All the examples are given in BBC Basic, and a complete set of demo programs and a Wimp procedure library are included on the accompanying disc.



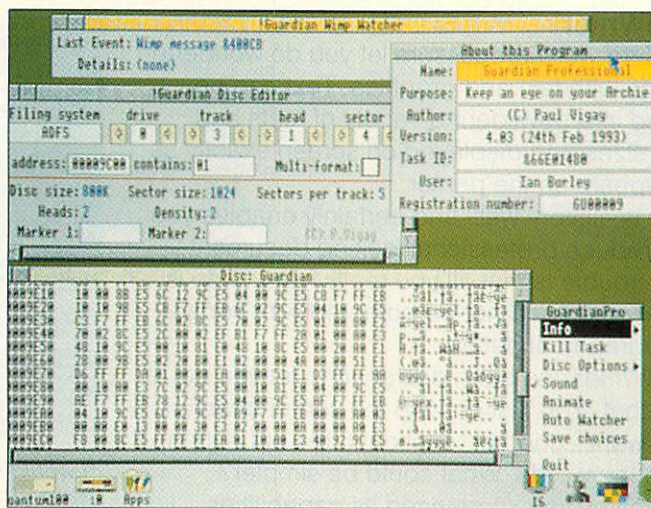
"This book can be used in place of Acorn's Programmer's Reference Manual for the majority of users ... I can highly recommend this book for programmers familiar with other programming environments wanting to learn how to write programs to multitask within RISC OS."

Acorn Computing

PROFESSIONAL PROTECTION

GUARDIANPRO, a new commercial version of the PD anti-virus program *Guardian*, has been released by Digital Phenomena. Continual background protection from over 25 different kinds of Archimedes virus is provided.

The system will warn the user if any viruses are spotted, and identified viruses can be eliminated automatically or simply brought to the user's attention. A suite of disc utilities including a hard disc backup routine and disc sector editor are also included. *GuardianPRO* is priced £9.95 from Digital Phenomena on (0705) 871530.



GuardianPro kills all known living germs

CHEAPER DTP PACK

COMPUTER Concepts has announced a price reduction on The Publishing Pack, which will save you £220 on the recommended retail price of the products when purchased separately.

The package was announced at the *Acorn User Spring Show* and includes a Canon BJ-200 bubble-jet printer, a ScanLight 256 hand scanner and *Impression Junior*.

The Computer Concepts *TurboDriver* for the BJ-200 is also included in the price, to enable fast quality printouts to be made.

The scanner component of the bundle has been in short supply recently, but supply problems have now been resolved. The total price of the Publishing Pack is £585.15 and it was a popular choice at the show.

For details contact Computer Concepts on (0223) 63933.



DTP need not cost the earth

POCKETBOOK TOOLS

WIDGET Software has released an enhanced version of its *Series 3 Tools* package. Although intended for the Psion Series 3 electronic organiser, this software is also compatible with the Acorn Pocket Book.

Originally, *Series 3 Tools* featured just a file manager and unit conversion utility.

The new version adds a power checking utility to indicate how much battery life is left, plus a task managing utility which is best described as an enhanced 'to-do list' application.

Series 3 Tools is priced at £49.95 including VAT. For further information contact Widget on (0438) 815444.

| | | |
|---------------------------------|--------------|--------------------|
| Battery | AA Used: | 12 Hours 0 Minutes |
| Life: | AA Fitted: | Mon 15 Feb 1993 |
| | AA Today: | 0 Hours 0 Minutes |
| | Mains Today: | 0 Hours 17 Minutes |
| | Total Today: | 0 Hours 17 Minutes |
| AA: Good Backup: Good Mains: On | | |

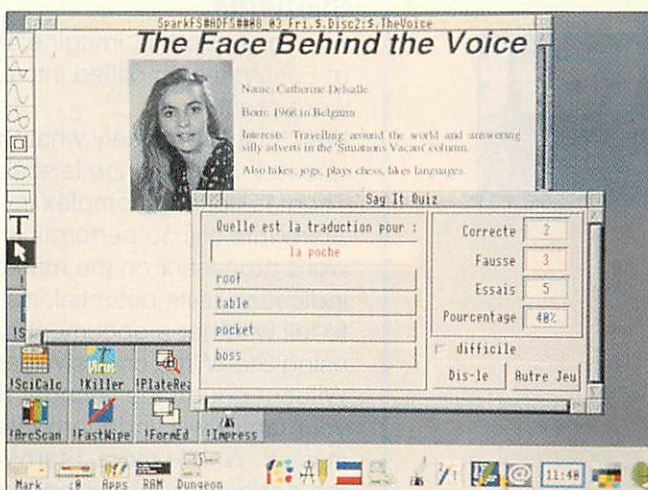
Power checking on your Pocket Book

SAY IT IN FRENCH

SAYITQUIZ is a another interesting new foreign language utility from Bits 'n' Bytes. The program contains a selection of digitised, rather than synthesised, spoken French words and phrases.

The text is spoken by a French native, and is used as part of a multiple choice vocabulary test. Different levels are available for more advanced students and there is a headphone mode for classroom use.

Even better, the program is shareware and registration only costs a fiver. Contact Mike Smith on (0752) 667599 for more details.



Ah! Le desktop qui parle...

A VISION IN GREYSCALE

WILD Vision launched a low cost monochrome real-time video digitiser at the Acorn User Spring Show. GreyHawk is a junior version of the popular full-colour Hawk V9.

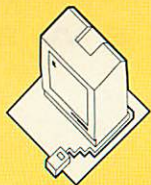
Like the Hawk V9, GreyHawk is mated to a dedicated version of ScanLight, the image processing application from partner firm Computer Concepts. Genuine 256 grey level palette shading is provided. ScanLight provides



256-greyscales from the television

plenty of tools to knock grabbed video frames into shape.

GreyHawk is also compatible with the Colour Card. The only obvious omission appears to be the lack of a S-VHS input to supplement the BNC composite video connector. Show visitors enjoyed an introductory price of £99 including VAT but this has now reverted to the standard price of £99+£6 P&P +VAT. Contact Wild Vision on 091-519 1455.



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EasiWriter

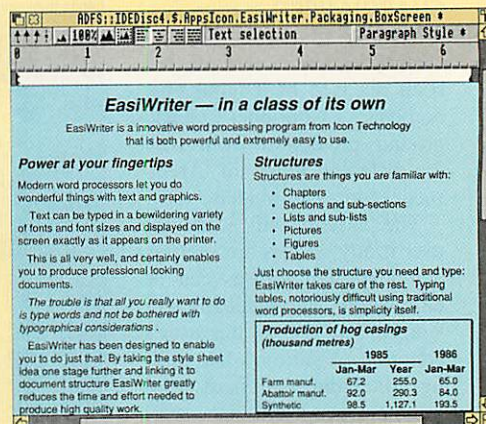
EasiWriter

Modern word processors let you do wonderful things with text and graphics. Text can be typed in a bewildering variety of fonts and font sizes and displayed on screen exactly as it appears on the printer.

This is all very well, and certainly enables you to produce professional looking documents. The trouble is that all you really want to do is type words and not be bothered with fiddly typographical details.

EasiWriter has been designed to let you do just that. You just choose the sort of structure you want - chapter, section, table etc. - then type the words. What could be simpler? Once you've experienced its capabilities you won't settle for less.

Price £149



"I would recommend EasiWriter as the best RISC OS word processor."

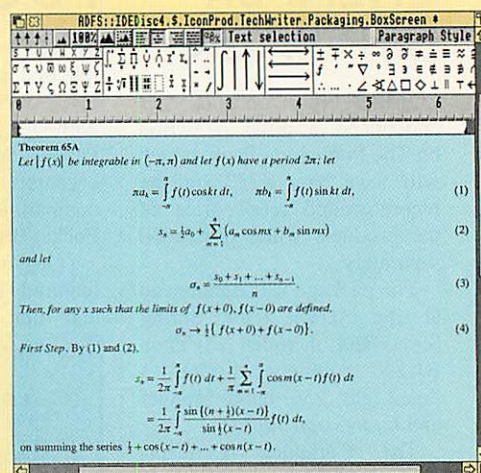
Archimedes World

TechWriter

TechWriter

Do you ever write documents that contain mathematical equations? If so, then you probably type the words first and add the equations later by hand. And no doubt you often dream of the day when you will be able to type the equations along with the words. Well, now you can stop dreaming because TechWriter has turned the dream into reality. We have taken all the features of EasiWriter and to these we have added a powerful equation editor that automatically applies the rules of mathematical typography on your behalf. All you do is choose the functions and type the symbols. TechWriter does the rest. Use it to produce exam papers, worksheets and technical reports with unrivalled ease. The end results are comparable with the best mathematical typesetters.

Price £199



"Looked on as a complete package for producing technical and academic documents TechWriter is nothing short of excellent."

Graham Bell, Acorn User

StartWrite

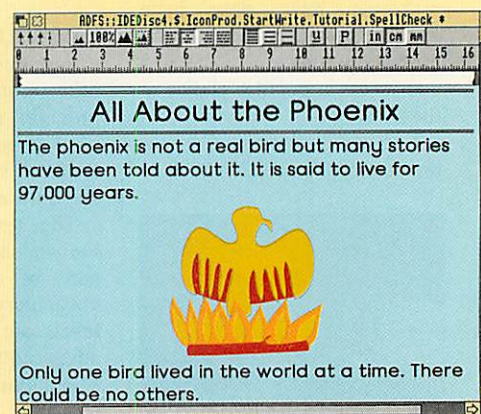
StartWrite

Just for a second, imagine all the plus points of EasiWriter simplified into a new entry-level word processor.

Well, that is precisely what StartWrite is all about. Even the price is scaled down. There is nothing complex involved, yet StartWrite still outperforms any comparable word processor on the market. As an indication of its potential, it's often impossible to tell whether a document has been created using StartWrite or EasiWriter.

Without doubt, the younger members of your family will find StartWrite an education in itself. What's more, StartWrite represents the perfect stepping stone to EasiWriter and TechWriter.

Price £69



For a free brochure, complete and return this coupon.

Name _____

Address _____

Prices exclude VAT. Call for education prices and site licences. EasiWriter, TechWriter and StartWrite are ideal for Archimedes and all A-series with 2MB RAM or more.



NEW CIS PAINTING APPLICATION

QPAINT is a new art package from Cambridge International Software. CIS hopes that *QPaint* will rival painting packages available for the Amiga and the PC.

Though incomplete, the pre-release version of *QPaint* that CIS had at April's *Acorn User Show* contained enough goodies to turn the heads of *Amiga Deluxe Paint* devotees.

The image generation tools feature a wide array of drawing and cutting facilities. Text can be previewed and is anti-aliased when painted.

The magnification tool splits the screen into real size and magnified halves, and the arrow keys can be used for scrolling. The circular and linear fills are excellent, using *Artworks*-style dithering, and conventional dithering is also selectable. With careful use of the blending and smoothing tools you can very quickly create an image that is almost misetakable for a screen-shot from an *Artworks* file.



The latest painting package put into action

CIS is still to fully-implement the smooth, tint, warp, envelope and perspective tools. The animation suite and memory-dependent undo buffers may or may not appear in the first release.

As a fast sprite generator and editor *QPaint* already performs very well. The unfinished product offers much to

recommend it above *Paint*. When CIS decides on a price, it will be interesting to see how *QPaint* fits into the established market.

For more details, contact Cambridge International Software, Unit 2a, 436 Essex Road, London N1 3QP, tel: 071-226 3340.

Jack Kreindler

SHARE IT

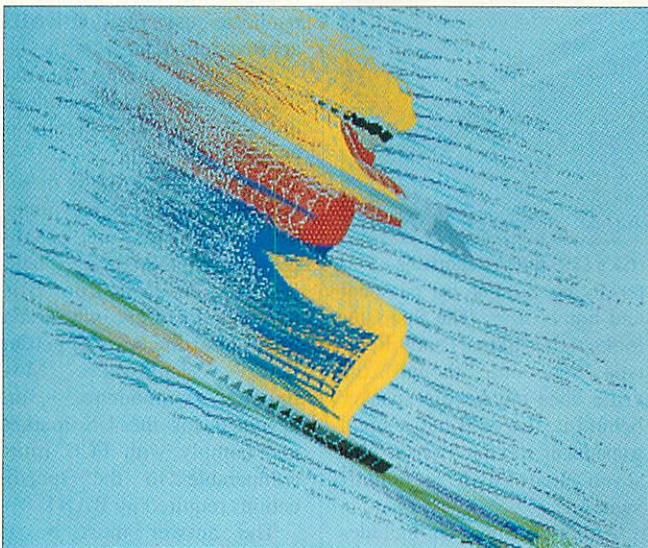
PROCESS is a rather impressive shareware graphics processing package from Denmark. The list of features is impressive and includes the ability to load 256-colour and 256-greyscale sprites, as well as colour separation into either RGB or CMYK.

Most of the painting tools from *Paint* have been incorporated into *Process*, along with a number of processing tools, like histogram stretching and equalising, noise removal and contrast control. Pictures can also have a number of effects applied to them such as rippling, pointillising and twisting.

Process should be available from public domain libraries (see Software Showcase at the back of the magazine) or direct from the author Henrik Bjerregaard Pedersen at Stengaards Alle 13 B, DK-2800 Lyngby, Denmark, tel: (+45) 42883756.

Rob Miller

PIC OF THE MONTH



ARTWORKS is proving to be an extremely popular package and many of the submissions for Pic of the Month are created with it. Eric Bramhill's *Skier* makes interesting use of the blend tool to achieve a sense of movement in the picture. Eric drew a single skier first, which he then cloned behind the original. He then filled the cloned skier entirely with white (both lines and fills) and blended it with the original skier over ten steps. Further background shading was added in *ArtWorks* and the picture was then grabbed using *Paint* and touched up using *Paint*'s spray can. Send your pictures to The Graphics Page at the usual address.

IN BRIEF

● **GRANNY'S GARDEN**, the recently released educational package from 4Mation is making the jump to CD-Rom. The extra space will also allow for a number of enhancements including better graphics and sound. If all goes well with *Granny's Garden*, 4Mation hopes to move further into the world of CD-Rom and promises some 'exciting developments' in the near future. Further details can be obtained from 4Mation on (0271) 25353.

● **PROARTISAN 2**, Clares' successor to its popular 256-colour art package, is coming along in leaps and bounds. The package can now make use of the 15-bit colour modes provided by Computer Concepts' Colour Card, giving access to 32,768 colours. More image processing tools have been included and the front end generally tightened up.

A definite release date has not been set yet although Clares is confident that the program will be shipping at the start of the summer. More information can be obtained from Clares Micro Supplies on (0606) 48511.

● **GreyHawk** is a new greyscale video digitiser from Wild Vision. The digitiser has been designed to complement Wild Vision's existing range of video add-ons and is fully compatible with Computer Concepts' Colour Card. GreyHawk is yet another example of Wild Vision and Computer Concepts' collaboration and further products are to be released in the future as a direct result. More details on the GreyHawk card can be obtained from Wild Vision, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne & Wear, NE35 9PE, tel: 091-519 1455.

● You can contact the Graphics Page with any news, views or comments by writing to Rob Miller, The Graphics Page, BBC Acorn User, 101 Bayham Street, London NW1 0AG, or by modem via Arcade BBS user #1144. Arcade is on 081-654 2212 or 081-655 4412.

If using Arcade, please stick to messages only. Any large files such as pictures should be sent on disc to the address above.



TOUCHING THE PLASMA SPHERE

PLASMA Sphere BBS is one of the few Archimedes systems running in the north-west. Sysop Keith Hall operates from Lymm in Cheshire, using an A410, equipped with an Arm3.

The system runs Carl Declerk's RiscBBS PD bulletin board software, and has around 228Mb of hard disc storage available. Keith is one of several programmers wrestling with the convoluted source code of Binkleyterm. This BBS mailer interface program originated as shareware for PC BBSs.

It is being ported to the Arc, with extensive changes to take advantage of Risc OS. A BBS mailer program enables communication between BBS systems to allow the worldwide exchange of FidoNet messages. Keith has also written several door programs that



Planet Earth calling the Plasma Sphere

will add features to RiscBBS.

The Plasma Sphere features over 50 file subject areas, including graphics, sound, games, programming, Econet utilities, a new fractals area, Psion/Pocket Book programs,

public key cryptography and Acorn support files.

Plasma Sphere is available on FidoNet as node 2:250/219 and supports all speeds to 16k8 HST or 14,400bps with V42bis.

LOW-COST MODEMS

US ROBOTICS has announced a new range of low-cost V32bis modems.

Each of the Sportster range features 14,400bps data and 9600bps fax class one maximum speeds. Error correction with V42 and MNP levels one to four is included, with V42bis and MNP5 compression. Lower speed capability from V21 (300bps) up, including V23 (1200/75bps View-data) is built-in.

Auto-answer and autodialling by pulse or tone, and call progress monitoring are featured, as well as four-number store, call monitor speaker and volume control.

Although the maximum DTE (computer-to-modem) speed of the Sportster is 57,600bps, USR says that only the Courier range will support the forthcoming VFast, 28,800bps standard.

Three variants of the Sportster are available, the external IBM PC version being of most interest to Acorn users. The other two are an internal PC card and a Mac-specific version. USR expects the Sports-



USR's £399 budget Sportster

ter to be bought by personal and home users. The Sportster looks rather like a Tandy Realistic intercom, though the grille does not have a speaker behind it: the PCB has a small transducer mounted on it, plus seven Leds and an on/off switch.

Although Sportster includes PC Blast Fax comms software and WinFax Lite at £399 inc VAT, the external version is available from The Serial Port, bundled with ArcTerm7, ArcFax, and modem cable for Acorns for £359 inc VAT.

Contact US Robotics on (0753) 811191, and the Serial Port on (0749) 670058.

LINES LAW

A PRESSURE group of 16 modem manufacturers and suppliers led by Dataflex Designs has been formed to eradicate use of non-BABT approved modems.

The group points out that users of unapproved modems on BT lines are liable to prosecution.

It is not illegal to buy or sell them, however, and unapproved modems are usually cheaper, undercutting legal approved products from British manufacturers who have had to bear the costs in getting BABT approval. Most imported modems are designed for the US market, and comply with FCC rules: comparable to the specifications required by BABT.

The answer must be to design approval into the equipment in the first place, and for the BABT fees to be set at a level that will allow UK manufacturers to compete more effectively with imported products.

We have the technology and the expertise - all we need is the incentive and imagination.

NEWS IN BRIEF

● **DAVID** Pilling is now shipping ArcFax 1.06, which has numerous improvements and tweaks, including the long-awaited class one modem driver. Other improvements include block driver support for port expansion cards, embedded destinations in faxes, header lines and an auto-answer server facility where a specified fax document can be sent to all fax callers.

Upgrades are free if you return your original disc with a stamp, or send £23.96 to David Pilling. PO Box 22, Thornton Cleveleys, Blackpool, FY5 1LR.

● **OWNERS** of the Acorn A4 portable and Pocket Book can find an active user group on The Digital Databank BBS. *Portable Newsletter* is a downloadable Wordz format magazine edited by Ned Abell, and contains news, hints, tips and reviews of interest to all Acorn portable users. The current issue includes a simple design for an A4 trackball support, and reviews of the Psion Series 3 and the Acorn A-Link. A demo of Wordz is also available from the Digital Databank, on (0707) 329306 (300-14400) and (0707) 323531 (300-2400) both 8N1 scrolling.

● **ARCTIC** BBS, the other London Archimedes BBS, has now graduated from being a FidoNet point to becoming a full node, and has the number 2:254/86. Arctic BBS is on 081-903 1309 and runs a 16k8 HST USR modem, catering for all scrolling 8N1 speeds and standards.

● **ANOTHER** BBS that has opened a specialist raytracing file area is DarcWorld IES BBS. Sysop Tom Crossland has uploaded hundreds of scene files, as well as high quality 24-bit raytraced images. There are several raytracer packages for both Risc OS machines and PCs, as well as source code for raytracing programs. DarcWorld promises one of the most comprehensive raytracing areas on any UK BBS. Call DarcWorld on (08675) 77724 300-14400 8N1.

● **YOU** can contact me with any ideas by writing to: David Dade, BBC Acorn User, 101 Bayham Street, London NW1 0AG or by modem on Arcade BBS, User #2 - 081-654 2212 or 081-655 4412.

How to Digitise a Video Picture Quickly on your Archimedes

Method A

- Contact your local Acorn Dealer to find out whether they offer a video digitiser for your Archimedes - don't hold your breath if you own an A3010, A3020 or A4000!
- Have your digitiser fitted.
- No lead is supplied? Attempt to identify connector and then go out and purchase the relevant lead. (Don't forget your wallet!)
- Run the relevant application.
- Make sure digitiser is real time and does not require a freeze frame video.
- Locate and change Contrast, Brightness, Red, Green and Blue controls to be able to view first image.
- Rewind the tape to preview. (if the image you wanted wasn't live and is retrievable!)
- Digitise required image.
- Image too dark? Change the Contrast, Brightness, Red, Green and Blue controls to roughly what you think will produce the right effect.
- Rewind the tape. Find the right spot and select the image again!
- Estimated alteration to the image controls not quite right? Change the Contrast, Brightness, Red, Green and Blue controls to roughly what you think will produce the right effect.
- Rewind the tape. Find the right spot and select the image again!
- Looks just about right, so save anyway!
- Load the sprite into another package for dithering.
- Save final image.

Method B

- Contact your local Acorn dealer to have a £79.00 Vision digitiser fitted to any Archimedes (exc. A4)
- Connect to your video source with the lead supplied.
- Run the Vision application and select any picture from any moving video.
- Image too dark? Use on screen controls to change Contrast, Brightness and Colour while processing.
- Save the fully dithered, High resolution 254 x 720 sprite.
- Use your sprite in any DTP document to impress your friends.
- Bank the money you have saved!

VISION
digitiser

A3010 £35.00 inc VAT
1Mb RAM Upgrade

A3010 £149.00 inc VAT
4Mb RAM Upgrade

Wise
add-ons

A3020 £59.00 exc VAT
2Mb RAM Upgrade

A4000 £59.00 exc VAT
2Mb RAM Upgrade

| | |
|-------------------------------------|---------|
| A3000 | |
| Hard Disc Drives | |
| 100Mb External | £479.00 |
| 200Mb External | £699.00 |
| HardCard100 | £429.00 |
| 20Mb IDE Internal with User Port | £179.00 |
| 60Mb IDE Internal with User Port | £269.00 |
| Memory Upgrades | |
| 1Mb RAM | £49.00 |
| 4Mb RAM | £129.00 |
| Expansion | |
| Econet | £39.00 |
| Serial Upgrade | £17.50 |
| User/Analogue Card | £39.00 |
| Podule Case | £15.00 |
| Video Digitisers | |
| Mono Vision Internal | £49.00 |
| Colour Vision Internal | £79.00 |
| Colour HiVision Internal | £129.00 |
| Mono Vision External | £62.00 |
| Colour Vision External | £92.00 |
| Colour HiVision External | £142.00 |
| Ultimate Expansion System | |
| MultiPodule (3 slot) | £38.00 |
| MultiPodule+20Mb+PSU | £229.00 |
| MultiPodule+60Mb+PSU | £309.00 |
| A5000/400/300 | |
| Hard Disc Drives | |
| 100Mb Internal SCSI | £399.00 |
| 200Mb Internal SCSI | £649.00 |
| 20Mb Internal IDE | £179.00 |
| 60Mb Internal IDE | £269.00 |
| Memory Upgrades | |
| 1Mb RAM for A400 | £45.00 |
| 2Mb RAM for A5000 | £89.00 |
| Expansion | |
| Econet | £39.00 |
| Video Digitisers | |
| Mono Vision | £49.00 |
| Colour Vision | £79.00 |
| Colour HiVision | £129.00 |
| Ultimate Expansion System | |
| MultiPodule (2 slot) | £39.00 |
| A3010 | |
| Hard Drives | |
| 20Mb IDE | £186.38 |
| 60Mb IDE | £271.49 |
| Memory Upgrade | |
| 1Mb RAM | £29.79 |
| 4Mb RAM | £126.81 |
| Ultimate Expansion System | |
| MultiPodule (IDE + 2 slot) | £41.70 |
| MultiPodule+20Mb+PSU | £220.43 |
| MultiPodule+60Mb+PSU | £297.02 |
| A3020/4000 | |
| Memory Upgrade | |
| 2Mb RAM | £59.00 |
| Expansion | |
| Econet | £39.00 |
| Ultimate Expansion System | |
| MultiPodule with User Port (3 slot) | £38.00 |
| PSU+Fan+Buffer Kit | £30.00 |
| MicroModules for Ultimate | |
| Laser Express | £249.00 |
| Colour Vision | £79.00 |
| Colour HiVision | £129.00 |
| SCSI, with CDFS | £69.00 |
| Analogue | £29.00 |
| Colour Video Out | £49.00 |
| Serial | £49.00 |
| MIDI | £49.00 |
| Scanner (Hand) | TBA |

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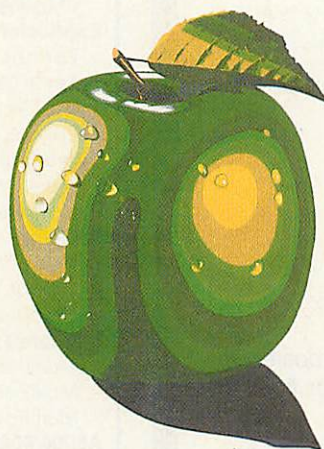
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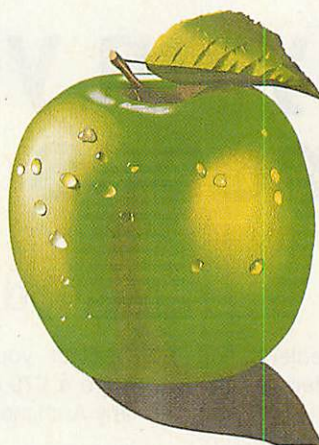
What can an Ace ProDriver do for me?

Standard Deskjet 500C Driver

Deskjet 500C ProDriver



Before



After

Tempted?

24 bit colour, colour separations, spooling, background printing and quality that speaks for itself, with upgrades starting from only £25. Whatever your printer, contact Ace – leaders in printing technology on the Archimedes.

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Suite 25
Robin Enterprise Centre
Leeds Road
Idle
West Riding of Yorkshire
BD10 9TE
Tel: 0274 620423
Fax: 0274 620419

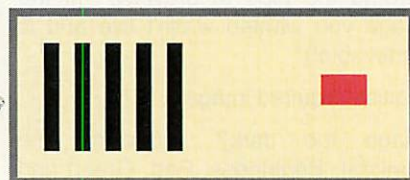
Hard Discs in the Classroom

As the complexity of software applications increases, hard discs are becoming more and more essential to the business of delivering these applications quickly and easily.

In the classroom, however, the contents of the hard disc are at the mercy of the users. Virus infections, accidental and even malicious deletions of important files are commonplace. Multiply these problems by the number of hard disc machines, and it all adds up to a big headache for the IT staff responsible for the upkeep of the computers.

Oak Solutions have the ideal answer to the problem - ClassRom. Launched originally for SCSI systems, ClassRom is now available for all Acom ADFS hard discs (ST506 and IDE). It consists of a small circuit board which plugs into one of the computer's expansion slots.

ClassRom works by splitting the drive into two partitions, electronically locking the first partition so that it can only be altered by the system manager via password protected management software. ClassRom goes much further than simple protection however. If a network is present, the ClassRom management tool can automatically manage



and update all ClassRoms on the network, massively reducing the workload of the system manager. Applications can be remote started, and machines can be automatically reset and cleaned up at the start of each session.

ClassRom is available as a plug in card for A300/400 and 5000 series machines. It is also available as an option built into ClassNet ethernet interfaces for all Archimedes machines (except A4), and as a retro-fit to Oak Solutions SCSI hard discs. For machines without a hard disc, a SCSI ClassRom unit can be added including a hard disc.

ClassRom

The complete protection and management solution



Oak Solutions Ltd Suite 25 Robin Enterprise Centre
Leeds Road Idle West Riding of Yorkshire BD10 9TE
Tel: 0274 620423 Fax: 0274 620419

ClassRom for ADFS costs £50.00 + £3.00 p&p + VAT
Please enquire for bulk discounts and prices of
ClassRom upgrades to SCSI and ClassNet cards.



INTERACTIVE VIDEO FOR SCHOOLS

CUMANA has launched interactive video (IV) systems, for both hardware and software. The NCET has accepted these under the Department for Education's recently-introduced pilot scheme.

Known as the Level One and Level Three Systems, the new kits meet the specifications laid down by the NCET for running the National Curriculum's *World of Number* disc.

Cumana's Level One IV system comprises a Pioneer CLD-V2300D PAL/NTSC video disc player, a Pioneer barcode reader and a Philips colour monitor.

The system costs £999 to educational bodies and Cumana has been appointed as a main distributor for *World of Number* (Key Stage One and Two) primary school mathematics materials and IV discs. These require no keyboard or computer skills.



Filming the National Curriculum Council's interactive video

Cumana also supplies an IV/CD-Rom system based on an Acorn A5000 computer. This system can run *World of Number* Key Stage Three and Four materials both on CD-Rom and interactive videos.

This workstation appears to offer the best value, since it gives access to both the

increasing number of IV discs available and to all the CD-Rom software as well.

It is hoped future government funding allows purchase of Acorn-based systems rather than just PC-based IV systems.

Further information can be obtained from Cumana on (0483) 503121.

POSTER WINNERS

MANY thanks to all the schools who entered our *Acorn User* Spring Show competition. Schools in the local area were asked to design a poster for the Harrogate show and the winners were from Oatland Junior School and The Joseph Rowntree School.



Many thanks to all who took part, including, shown above, pupils from Moorside Junior School

NETWORK MANAGER

FOR those managing networks, either Econet or Ethernet, level one or level three, there are a variety of new pieces of management and performance software.

Netmanage, first seen at Bett in January, is now being marketed by Suitable Software, tel: (0638) 720171. This allows easy management of school-based networks. Users can be easily set up in groups with common characteristics, and directory structures can be set and allocated.

Priced at £50 I would recommend that all network managers investigate further.

Digital Services has released a new product specifically designed to provide Acorn AUN level four Ethernet networks with more speed.

Netgain for Ethernet, follows its previously successful *Netgain for Econet* and Digital Services claims the concentration on removing bottlenecks and improving caching tech-

nology has resulted in staggering speed improvements.

This system takes no memory on the workstations and trials have shown it loading software such as *Artworks* in six seconds compared with 87 seconds on standard level four AUN Ethernet.

The price is £200 for the server pack and the first ten stations, with additional ten-station packs at £100. For more details contact Digital Services, tel: (0705) 210600.

Angelsoft Education is marketing a piece of software called *AppFs*, designed to serve applications round any network at increased speeds.

Written by people who have been involved in the use of educational networks for a number of years, this greatly increases the viability of serving applications via a network.

Further information from Angelsoft, 35 Heol Nant, Swiss Valley, Llanelli SA14 8EN.

IN BRIEF

● Widget software has come up with a new idea for software training.

It has launched three training videos to accompany its popular primary and special needs software packages – *Choices*, *Screenplay* and *GridIT*.

Each video provides helpful instructions on how to load the software; using the program; using the existing resources and making new customised resources, as well as suggesting curriculum ideas.

The videos should enable teachers working on their own in schools, or groups of teachers undertaking In Service Education Courses to learn how to use these pieces of software.

Choices is a framework program designed to encourage children to explore decision-making and selection processes.

Screenplay is a versatile program that enables children and teachers to create exciting animated stories incorporating pictures, text and sound.

GridIT helps children develop spatial awareness, number skills and logical thinking.

Each video lasts approximately one to one and a half hours and can either be hired for five working days or bought outright. This is a great idea. Perhaps other software houses could take note.

Further information on both the software and the videos can be obtained from Mike Detheridge, at Widget Software on (0926) 885303.

● *Startwrite* has been upgraded to include a speech option. In order to take advantage of this facility you must have a copy of either Superior Software's *Speech* or PEP's *Speech* software.

Vouchers for either option at reduced prices will be given when purchasing *Startwrite*.

Priced at £55 to education users, and given the possible inclusion of numerous language dictionaries, this seems a good piece of software to investigate, especially for teachers working with pupils who have specific learning difficulties.

If you want further information, contact Icon Technology on (0533) 546225.

EDUCATION WAS NEVER THIS MUCH FUN

Noddy's Playtime is a graded creativity and entertainment package for home computers based on solid educational principles for 3-7 year olds.

Drive with Noddy in his car and explore the magic of Toytown, visiting the 8 special learning locations.

- Railway Station - memory game
- N&B Works - observation game
- Chimney House - musical fun
- Noahs Ark - jigsaw puzzle
- Farm Yard - animal matching
- Market Place - letter recognition
- Post Office - counting
- Police Station - maze game

Also included is a junior Art Package which develops your child's creative ability.

- Picture Colouring.
- Electronic 'fuzzy felts'.
- Freehand drawing with pens and spraycans.
- 50 pre defined fill patterns.
- One finger on, one finger off mouse control for tiny hands.

Noddy's Playtime features user friendly icons so that even the youngest family member can learn and have fun.

There is a choice of 3 carefully defined learning levels designed in consultation with teachers. Noddy's Playtime also includes FREE: Toytown map, keyboard overlay and wobbler. A comprehensive manual and parent teacher guide will enable you to bring your child's imagination to life.

RISC OS 2 + 3 compatible



THE JUMPING BEAN CO.

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NODDY'S™ PLAYTIME

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SHORT REVIEWS

This month we take a quick look at some of the latest products around – from a guide to printing, to a new hypermedia package.

A GUIDE TO PRINTING IN RISC OS 3

Supplier: Hampshire Microtechnology Centre
Tel: (0705) 378266
Price: £6 per copy, £50 for ten copies, £25 for photocopy master

Let's face it, technospeak rather than English is the first language of computer manual authors. In fact, Acorn's writers are better than many, but any help with translation is welcome, which is where these two A4 booklets come in.

The first covers Risc Os 3 but if you've bought an Archimedes in the last 18 months or so it provides a handy introduction to your machine.

I upgraded to Risc OS 3 a few months ago and discovered a number of facts about the operating system which I hadn't realised before. The second deals with printing, an activity which never ceases to cause headaches.

Clearly presented in pretty plain English, if you find printed materials reassuring, then I can certainly recom-

mend these accessible and inexpensive guides.

NAVIGATOR

Supplier: Topologika
Tel: (0733) 244682
Price: £40 + VAT

Navigator is a navigation systems tutor. In other words it teaches the user how to move around maps using a variety of methods, including latitude and longitude, ordnance survey references, compass points, orienteering bearings and vectors.

One of the main strengths of this program is that it can be used across the age and ability ranges. For example, the Tiny Turtle option gives a limited, preset choice of instructions for moving the pointer or dart, but children can then progress to Turtle, which allows them to input their own directions. Features can also be disabled via a Preferences menu.

Maps can be *Draw*, *Paint* or compressed *Imagine* files and a small selection is provided with the package – I found a school, a treasure island and the Orkneys on the disc.

Creating your own is obviously fairly time-consuming but worth it if you want to study a particular area in depth. You can design your own darts, too, although the ready-made collection contains plenty of shapes, figures, cars, boats and planes.



Optima: produces hypermedia books that are good enough to eat

The Calibrate menu means you can adjust the scale of movement on a map and it's also possible to add a link-point, so when students reach a specific location a message is triggered or another map is loaded. This can give the illusion of zooming in on a region.

Students can play around with *Navigator*, finding out for themselves how the different systems work, or they can learn through investigations set by the teacher. Either way, this is a simple idea which has been effectively executed to produce a neat program.

OPTIMA

Supplier: Northwest Semerc
Tel: 061-627 4469
Price: £18 + VAT

Optima is a hypermedia program which allows text and graphics to be positioned on the screen to produce pages which build up into books.

More excitingly, sound can also be integrated, so, for example, a picture of a pig can be made to squeal or the computer can be set up to read dialogue aloud.

The handbook is small and spiral-bound, so flicking through it is straightforward, and it's easy enough to get going with the package. A few sample *Draw*, *sprite* and *sound* files are included, and of course you can import them from other sources or, even better, create your own. The only feature I found odd is that once a graphic or text is

selected, it automatically follows the cursor around, whereas my instinct is to drag it. This meant that at first I kept inadvertently spoiling my page but, hey, I'm adaptable, and I soon got the hang of it.

Its presentation suggests that *Optima* is aimed at young children and, given Northwest Semerc's area of expertise, special needs users, but older students or adults using sophisticated raw materials could produce sophisticated results.

This is a nice package and teachers and pupils will find many uses for it in the classroom. However, while I enjoyed using it, I have to say it didn't quite wow me, but perhaps I've just become too blasé about this type of software.

Alice Smith

EARLY LEARNING JOYPAD

New for early learners from Holdfast is the Joypad. Specially designed for younger children who find keyboards, mice and joysticks too tricky, it is friendly and tough and will sit happily on the carpet.

It is attractively designed in red and yellow and the chunky round shape will suit all surfaces. It is possibly suitable for special needs use as well. From simple one-button activities through to full mouse emulation, the joypad promises to be a robust alternative to the mouse.

It plugs directly into the joystick port on the A3010, and use of the Leading Edge joystick interface for other Arcs is recommended. Priced



at £24.99, it is available now. If you are interested, further information can be obtained from Holdfast on (0454) 411126.

Clare Johnson

TRAINING FILE

For those interested in improving their skills, Acorn is running its training conference, Access IT, during the summer term.

Sessions range from network management and use to curriculum-based sessions and beginners. Many educational software houses will exhibit, as well as running training sessions on their own software.

The conference at Nottingham University takes place on 9 and 10 July. The price, including full board and conference fee is £425. Booking early gains a reduced price of £169 + VAT. Contact Acorn on (0223) 254254.

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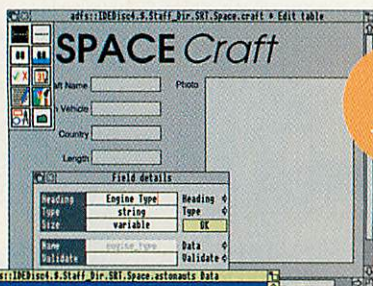


Squirrel

Create Mode

Build new databases with just a few mouse operations. Never before has table creation been this quick and easy. Squirrel is a no limit product! There are no limits to the number of characters in a field, fields in a record, or records in a table. Both single and multi line text fields are supported. File definitions may be changed at any time.

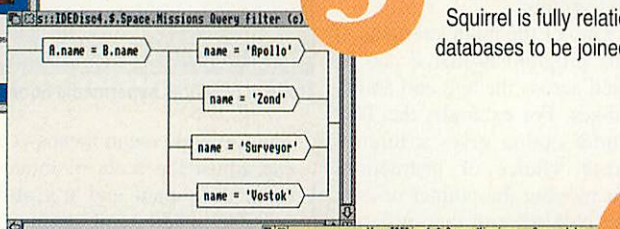
1



Query Mode

Squirrel incorporates a radical new graphical approach to creating complex queries -- a series of INCLUDE and EXCLUDE filters are linked to form a graphical flowchart. Squirrel is fully relational, allowing data from multiple databases to be joined in one query or report.

3



Query Data Mode

Browse through results of queries on screen. Query definition may be saved, or query data may be re-indexed as a new table.

4



Data Mode

Store images, text and sounds within each record to create powerful multi media databases. Browse through the database in any field order.

2



Reporting

Include Sprites and Drawfiles in reports to produce desk-top publishing quality output. Powerful label printing allows multiple labels across the web.

5

SPACEFlight

Apollo Project Mission Log

| Mission Number | Launch Date | Crew Members | Duration (hours:mins) | Objective of Mission |
|----------------|------------------|-----------------------------|-----------------------|---|
| Apollo 7 | 11 October 1968 | Schmitt, Eisele, Cunningham | 280:00:03 | Earth orbital manned test |
| Apollo 8 | 21 December 1968 | Borman, Lovell, Anders | 147:00:42 | Moon orbital test |
| Apollo 9 | 3 March 1969 | McDuff, Scott, Schweickart | 241:00:54 | Docking test |
| Apollo 10 | 18 May 1969 | Stallford, Cernan, Young | 192:03:23 | Lunar Module flight test |
| Apollo 11 | 16 July 1969 | Armstrong, Aldrin, Collins | 195:18:35 | Manned lunar landing |
| Apollo 12 | 14 August 1969 | Conrad, Gordon, Bean | 244:36:25 | Manned lunar landing |
| Apollo 13 | 11 April 1969 | Lowell, Swigert, Haise | 142:54:41 | Manned lunar landing (Aborted) |
| Apollo 14 | 31 January 1971 | Shepard, Roosa, Mitchell | 216:01:57 | Manned lunar landing |
| Apollo 15 | 26 July 1971 | Scott, Irwin, Worden | 295:11:53 | Manned lunar landing deployment of Lunar Roving Vehicle |
| Apollo 16 | 16 April 1972 | Young, Mattingly, Duke | 265:51:05 | Manned lunar landing deployment of Lunar Roving Vehicle |
| Apollo 17 | 7 December 1972 | Cernan, Evans, Schmitt | 301:51:08 | Manned lunar landing deployment of Lunar Roving Vehicle |

| | |
|---|--|
| Officer Commanding Vandenberg Air Force Base Santa Maria California USA | The Director Kennedy Space Centre Cape Canaveral Florida USA |
| The Director Wallops Island Space Centre Bogues Bay Virginia USA | Officer Commanding Edwards Air Force Base California USA |
| The Director Baikonur Space Centre Leningrad Tauridam Russia | The Director Northern Space Centre Plesetsk Archangel Russia |
| The Director San Marco Equatorial Range Formosa Bay Kenya | The Director Guiana Space Centre Kourou French Guiana |
| Dan Dare Pilot of the Future Croydon Surrey UK | The Director National Aeronautics and Space Administration Washington DC USA |
| José Jiménez Mexican Space Project Tegucigalpa Mexico | The Director European Space Agency 1442 Haguenast Rhone Italy |

What the press say...

"It has leap-frogged all the database development of the past 10 years and emerges as the pre-eminent data storage system for the Arc."

Steve Turnbull, Micro User

"The ease of table creation, data entry and browsing, searching and sorting place this innovative software in the first league."
"No other product approaches the performance of Squirrel at anything like the price and it is to be highly recommended."

John Schild, RISC User

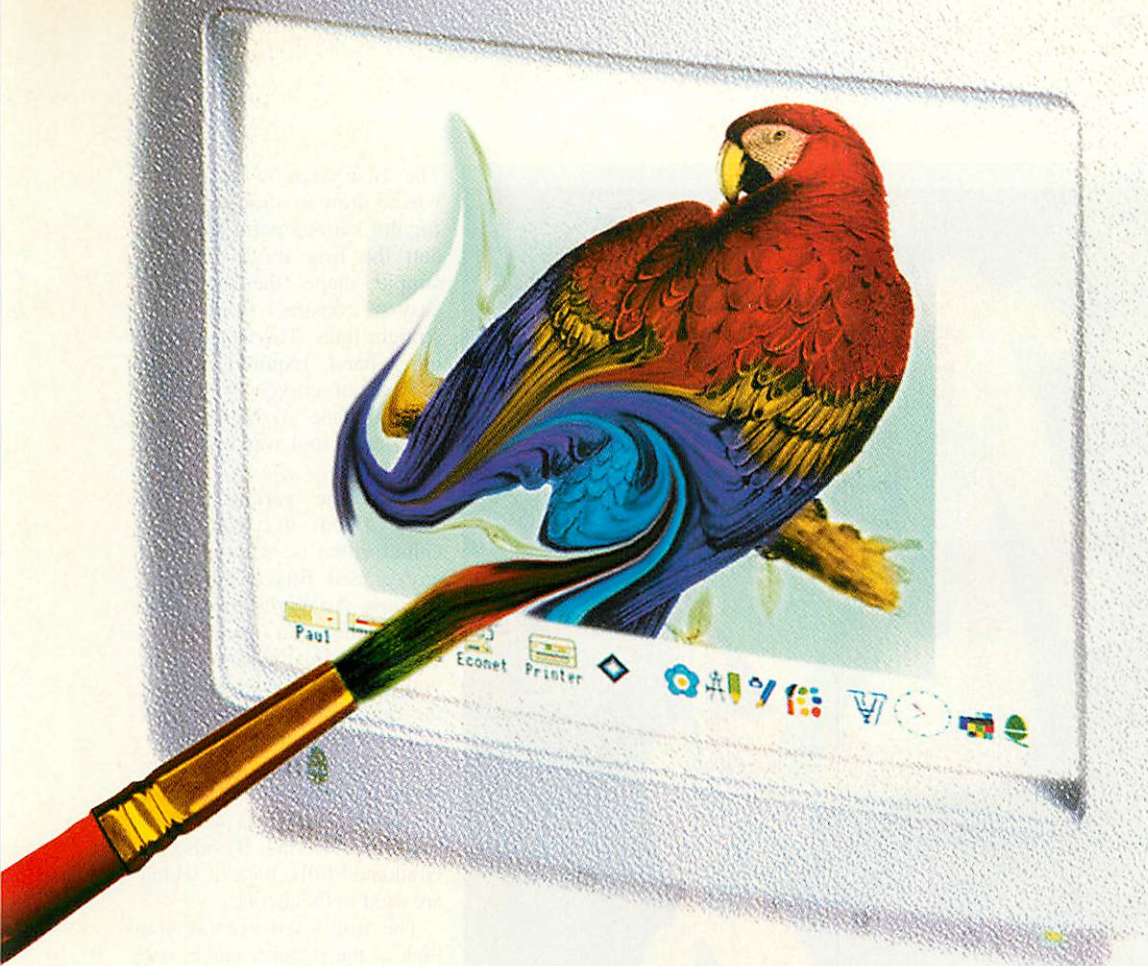
"Probably the ARC DBMS most in touch with current trends in database development."
"You are going to need Squirrel which is easily the most powerful database available today."

Archimedes World

| | |
|----------------------------------|----------------|
| Squirrel Single User | £ 129.00 + VAT |
| Squirrel multi user/Site Licence | £ 516.00 + VAT |
| Squirrel 'C' Developer's Toolkit | £ 99.00 + VAT |

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Graphics is one of the Archimedes' strengths, but which product do you choose? Rob Miller shows what can be achieved with the leading packages

GET IN THE **PICTURE**

One of the strongest features of the Archimedes and of Acorn's other 32-bit computers is their graphics. The fact that it's possible to create colourful, high-resolution pictures has led to a plethora of software packages being released over the years.

The choice of art packages is vast and the task of comparing one against another extremely difficult. This article therefore sets out to show what's possible with the leading programs at present. I'll also attempt to show what can be done with just the software supplied with the Archimedes (*Paint* and *Draw*).

Choosing an art package from scratch is hard, so it's important to establish exactly what you want, with a few basic guidelines. Like any other software purchase, you should make a list of the things you require the software to do – it's no good just going by the way the program looks on screen, or on the fact that you

like the supplier. You should also know roughly how much you can spend on the package.

The first thing to decide is what sort of graphics program you need. There are two distinct types; pixel-based (or bitmap) and object-based (or vector). *Paint* and *Draw* (supplied on Applications Disc 1 with Risc OS 2 and in Rom with Risc OS 3) are bitmap and vector graphics programs respectively. *Vector* (covered later in this article) is a vector graphics program.

If you already have an Archimedes, you will almost certainly have used *Paint* and *Draw* and should realise the difference between the two. *Paint*, being a bitmap graphics program allows you to create pictures from single dots (or pixels). These are arranged in a grid format and a block of them is referred to as a sprite.

Draw is a vector graphics program and uses lines and curves (defined by their co-ordinates) to construct pictures.

If you want a vector graphics program, there are really only two choices available: *Art-Works* from Computer Concepts and *Vector* from 4Mation. Both are included in this round-up and are covered in detail later on.

If, on the other hand, you want to produce bitmap graphics, the list of possible programs is seemingly endless. Looking closer at the features provided by each program should make decisions easier.

Virtually all bitmap graphics programs offer a basic set of tools such as points, lines, triangles and circles. Editing via a magnified version of your image is also common, as is cutting out and moving areas of a picture. Different programs approach a task in different ways; how they do so may affect your choice.

Having had experience of nearly all the art packages that have come out for the Archimedes, I've formed my own list of ideal features for the perfect program. No one pack-

age contains the lot, although a few come close.

Being able to draw individual pixels is an important facility and is essential for editing work and adding fine detail to a picture. This may sound an obvious feature to include, but, surprisingly, is missing from some art packages. The facility for drawing continuous, freehand lines (often referred to as doodling) is also important and allows natural-looking results. By natural I mean similar to drawing with traditional crayons or painting materials.

Other tools to look out for in a good art package are graduated fills (useful for giving a solid look to objects); any-shape cut-outs (for extracting and moving irregularly shaped areas of a picture); and some form of grid-locking (for accurate placement of lines and shapes). In addition, most software producers include unique features to make their program stand out from the rest.

GEORGE SNOW

BEST VECTOR GRAPHICS

ARTWORKS

Supplier: Computer Concepts
Tel: (0442) 63933
Price: £169 + VAT

Being a vector graphics program, *ArtWorks* is often assumed to be only suitable for pictures that have a certain 'artificial' look to them. Using the rain forests as a theme, it's quite easy to see that this is not the case.

I took the example of a tree frog. This was ideal because of its combination of bright and vivid colours, something *ArtWorks*' clever dithering technique handled extremely well, as you will see from the illustration on the right.

The subtle blend of one colour into another makes *Artworks* ideal for reproducing the effect of light and dark on the body of the brightly coloured tree frog.



ArtWorks dithering technique allows vivid colours to be blended smoothly

The first step in the picture was to draw in a rough outline for the various parts: the reed and the frog itself. Being a simple shape, the reed was easy to construct from a few straight lines. The frog, on the other hand, required a large number of curves to get the correct shape. *ArtWorks*' free-hand draw tool was extremely useful here.

Next, the various shapes were filled in with 'flat' colours; that is, without using any graded fills or blending. Because *ArtWorks* uses a 24-bit palette, it's possible to select practically any colour you need, so it was easy to get the range of greens, reds and yellows required.

Finally, the flat areas were shaded to give the frog a sense of depth. *ArtWorks* contains two tools for this, Blends and Graduated Fills, both of which are used in the picture.

The frog's left eye (as you look at the picture) makes use of a graduated fill to give it a spherical appearance. The frog's limbs all make use of blends for highlights and/or for shading.

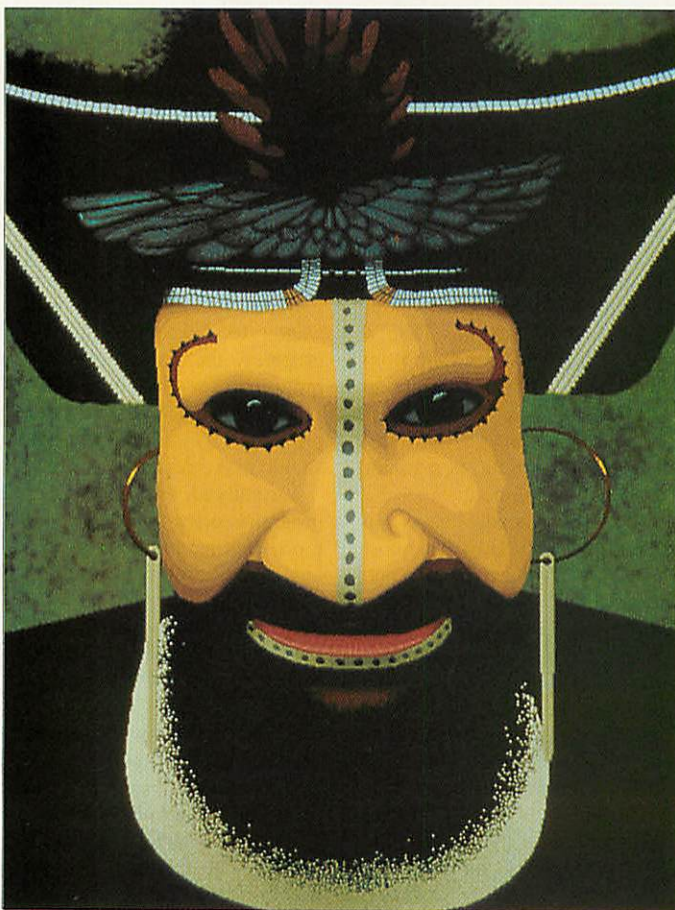
BEST BITMAP GRAPHICS

REVELATION IMAGEPRO

Supplier: Longman Logotron
Tel: (0223) 425558
Price: £139 + VAT

Although human portraits are perhaps one of the most common types of painting, they are quite often one of the hardest pictures to draw. The human form, especially the face, is seen everywhere: in newspapers and on television. Because of the familiarity of the image, it is essential that you get the proportions correct on a portrait if it's going to look any good.

The head was drawn first as a kind of flattened egg. The top and bottom parts didn't need to be too accurate as they were both going to be obscured in the finished picture by the hat and beard. The eyes, mouth and nose were



Revelation ImagePro's spraycan tool creates the dappled effect on the beard

then added as outlines. A good point of reference here was a mirror. The various markings on the face were then added and the whole of the face filled in with approximate colours.

The main shading on the face was then applied by drawing in the 'contour' lines by hand and then filling each successive 'height' with a different shade of yellow. Finer shading was then achieved using *Revelation ImagePro*'s Wash tool, with black for darker areas and white for the lighter ones.

Next, the chin was filled in roughly with a dark brown; the beard was then added to the image in black, with the spray can tool.

The grey dappling effect was accomplished by using a white wash, sprayed onto the black background. The hat, plus the feathers were then added, with the feathers being drawn by hand to get them looking correct.

Finally, the background was added by creating a separate picture of random greens. This was then used as a motif for flood filling.

PAINT & DRAW

Free with all Acorn Risc OS machines

Rather than use every feature of *Paint* and *Draw*, I decided to produce a simple but effective picture; making use of what I consider to be the most useful tools in each program.

The first thing to do was create a Mode 28 screen in *Paint*. I then used the Zoom tool to scale it down on-screen, so I could get the proportions correct. This is extremely difficult if you are having to scroll a window around. Detail at this point was unimportant so reduced scale didn't matter.

The branches were drawn using a combination of the



Paint and Draw let you construct striking images with a few, simple elements

Line and Pencil tools. The parrots were added as rough outlines with Pencil, and filled in with the Paint Can tool.

The next step was to scale

the picture up (using Zoom) and add detail. The ability to have multiple views in *Paint* made it simple to work on a magnified version while seeing

ing what it would look like at 100% scale. Finally, the background (everything other than the silhouette) was made transparent by filling it in using 'mask' as the colour.

Draw was used to create the background. The sky is two rectangles, one orange one yellow, graded together. *Draw* automatically chooses the graded colours for a smooth appearance. The sun is two circles, one on top of the other, graded from white to yellow.

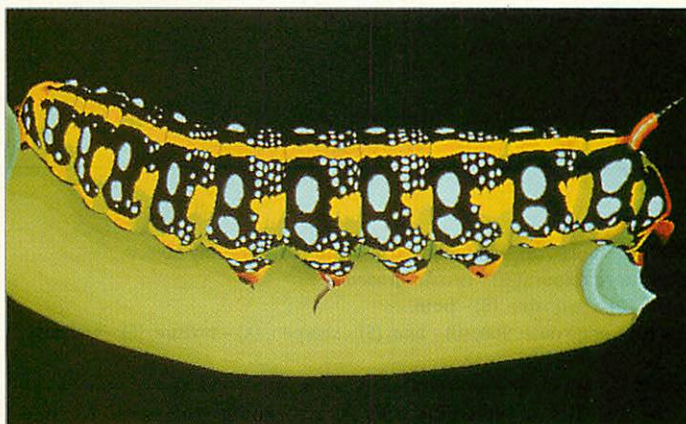
Lastly, the two images were combined in *Draw* and the finished picture grabbed from the screen using *Paint*. Because Mode 28 had been used, the picture had to be cut out in several parts and re-assembled in *Paint*.

PROARTISAN 2

Supplier: Clares
Tel: (0223) 425558
Price: Not yet announced

When magnified, small wildlife such as insects and caterpillars are transformed from mere grubs into beautiful objects. Using a number of techniques, it's possible to reproduce the sharp look of a wildlife photograph.

I started with black background for maximum contrast with the bright colours of the subject. The plant stalk was drawn in a single green, to ease scaling and positioning of the caterpillar. A rough outline of the caterpillar was added.



ProArtisan 2 allows you to reproduce the sharp look of a wildlife photograph

The caterpillar is made up of ten segments, so these were marked out next. Each segment is quite similar, so it was possible to draw the markings

on one, and then copy them to the others. In some cases, the duplicate markings were either scaled, rotated or both, in order to make them fit.

The colouring of the caterpillar took the longest amount of time as each white marking was anti-aliased (given a smooth edge) against the dark grey skin.

I contemplated doing the same with the coloured areas, but this lost sharp contrast with the background, so I decided against it.

Most shading was applied by hand, although *ProArtisan 2*'s Opacity tool, which allows a preset amount of colour to be mixed with what is already on screen, was useful to fill in larger areas.

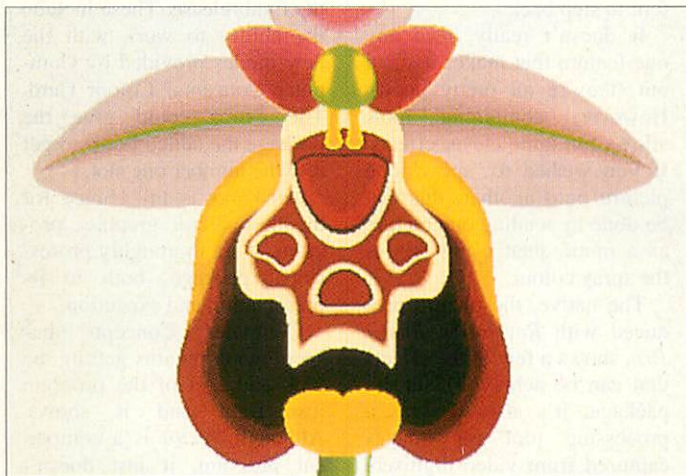
Extra shades were produced for the plant stem by designing a dither pattern of the two lightest greens.

VECTOR

Supplier: 4Mation
Tel: (0271) 25353
Price: £85 + VAT

The plant kingdom, like most of nature, displays an amazing semblance of symmetry, not least in the orchids found in tropical rain forests. Quite often, the patterns on orchids are so bright and sharp that one would imagine they had been painted in. Although *Vector* leans more towards being a technical art package, it's quite able to handle such a picture.

Because the picture was too symmetrical, I started off by drawing in a temporary vertical axis, around which the various parts of the picture could be copied and flipped.



Vector's Interpolate tool lets you alter shapes and colours using morphing

The outlines of the various petals and patterns were then added and copied if required.

Some parts, such as the top petal, were produced as two

objects (one a mirror reflection of the other) which were then broken up into lines. They were then recombined as one shape. This technique made it

easy to create the symmetry in the picture.

Next, each part of the flower was filled in with the colour most prominent in that bit. Because *Vector* uses 24-bit colour (in other words 16,777,216 colours) it was possible to select the exact shade required for each piece.

Although the Archimedes cannot display full 24-bit colour as standard, Risc OS 3 does a competent job of displaying extra colours as dithered patterns.

Shading on the flower was achieved by means of *Vector*'s Interpolate tool, which allows one object to be morphed into another. The shape and colour of an object are both altered, making it easy to produce highlights and shadows.

| FEATURES LIST | | | | | | | | |
|--|-----------------|-----------------|--------------------|------|-------------|--------|----------|--------------|
| Packages | Individual dots | Lines/Shapes | Circles/Ellipses | Text | Cut & Paste | Fills | Gridlock | Scale/Rotate |
| Paint & Draw | ✓ | ✓ | ✓ | ✓ | R | F | ✓ | ✓ |
| Rev ImagePro | ✓ | ✓ | ✓ | ✓ | R,A | F,G,CG | | ✓ |
| ProArtisan 2 | ✓ | ✓ | ✓ | ✓ | R,A,D | F,G,CG | | ✓ |
| ArtWorks | | ✓ | ✓ | ✓ | O | F,G,CG | ✓ | ✓ |
| Vector | | ✓ | ✓ | ✓ | O | F | ✓ | ✓ |
| Packages | Patterns | Special effects | Zoom/Multiple View | | Undo | | | |
| Paint & Draw | | | ✓ | | ✓ | | | |
| Rev ImagePro | B | T,D,B,S | ✓ | | ✓ | | | |
| ProArtisan 2 | B | T,D,B,S,X,E | ✓ | | ✓ | | | |
| ArtWorks | | | ✓ | | ✓ | | | |
| Vector | | | ✓ | | | | | |
| NOTES | | | | | | | | |
| 1 Types of cut & paste shown are (R) – rectangular, (A) – any shape, (D) – distorted, (O) – Any object | | | | | | | | |
| 2 Fills shown are (F) – flat colour, (G) – graded colour (CG) – circular graded. | | | | | | | | |
| 3 Patterns shown are (PD) – pre-defined, (D) – definable, (B) – both. | | | | | | | | |
| 4 Special effects shown are (T) – trace, (D) – edge detection, (B) – blur, (S) – sharpen, (X) – texture, (E) – emboss. | | | | | | | | |

The best way to show what you can do with each package is by means of illustration. When you think of computer graphics, you're more likely to imagine hard edges and rather artificial-looking pictures.

Nature, though, provides ideal material for showing what can be accomplished. Images of rain forests, and the flora and fauna within, was the topic we chose to test out our packages. The range of colours and textures present in such an environment are perfect for stretching any program right to its limits.

CONCLUSION

After exhaustive use of the above programs, I've decided to make not one but two choices as to my favourites.

Out of the bitmap art packages, *Revelation ImagePro* came out on top. Although at first it looks a simple program (the toolbox is particularly uncluttered) the way in which you can combine the different tools and effects puts it above

the rest. It's an incredibly easy package to use and no specialist knowledge of graphic technique or theory is required. If there's something you're unsure of, just have a go. Then, if you're unhappy with the result, use the Undo tool to step back.

It doesn't really have any one feature that makes it stand out (they're all pretty good). However, combining tools allows for some clever effects. If you wished to 'spray' one picture onto another, this can be done by loading one picture as a motif, then using this as the spray colour.

The native, the picture produced with *Revelation ImagePro*, shows a few of the effects that can be achieved with the package. It's also ideal as a processing tool for images captured from video digitisers and scanners.

Revelation ImagePro is by no means the cheapest of the art programs on the Archimedes, but then you get what you pay for. In this case you

are going to have to pay around £139, and it's money well-spent.

However, buyers should bear in mind that the copy of *ProArtisan 2* used for this review was unfinished. Additional features are planned for the final release. These include the ability to work with the new modes provided by Computer Concepts' Colour Card. The extras could give the package the added boost to get it to the number one slot.

ArtWorks is my choice for the best vector graphics program. It's a thoroughly professional package, both in its presentation and execution.

Computer Concepts has spent many months getting the look and feel of the program just right and it shows. Although *Vector* is a competent program, it just doesn't have the same smooth feel as *ArtWorks*.

If you want to produce precise and complex pictures with a view to having them printed professionally, *ArtWorks* will

fit the bill. A word of warning though: it's not a program for the impatient among you.

The picture of the tree frog which we have used took four days of almost continuous work and was still unfinished. Given time though, the results can be outstanding and really professional artwork can be produced.

Feature-wise, *ArtWorks* contains virtually all the tools you could require, from distortion and perspective envelopes to graded fills and blends. Another plus point is that *ArtWorks* has been written in a way so that extra tools can be added at a later date without having to completely upgrade the whole package.

Again, *ArtWorks* might cost a little more than most people would expect to pay, but, like *Revelation ImagePro*, you get exactly what you pay for.

£198.58 inc VAT gives you an extremely proficient piece of software that should be enough to satisfy any serious graphics enthusiast.

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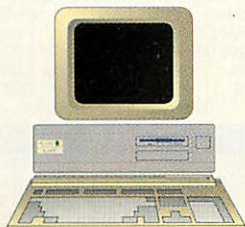
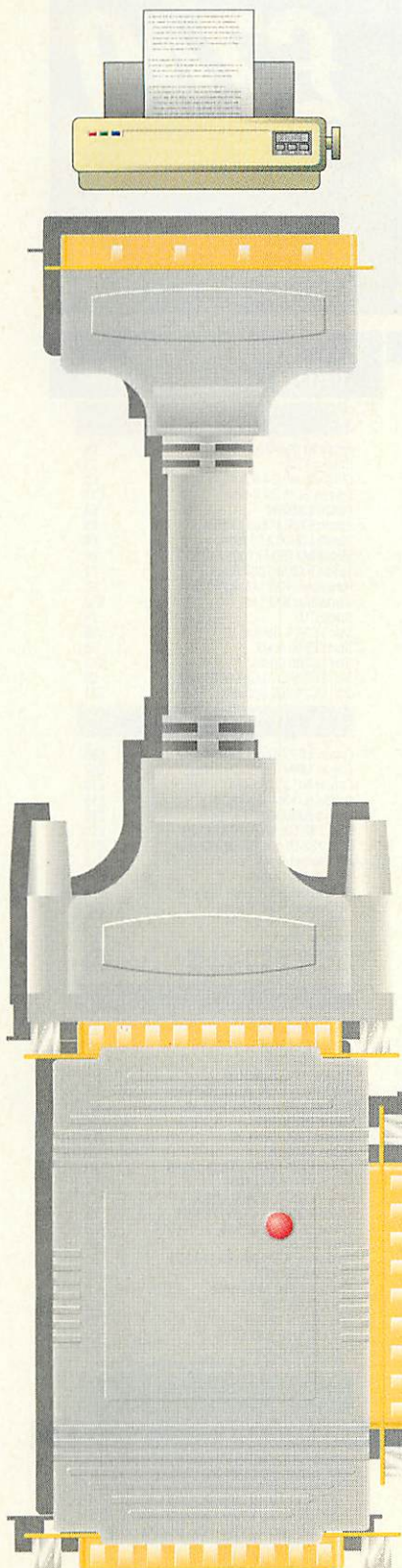
There are two versions of the interface available; Mono/SCSI which provides a standard SCSI bus, and Printer/SCSI which allows printing using the parallel port, as well as connection to a SCSI bus.

The Printer/SCSI interface is supplied with a cable and full fitting instructions, all for only £75 (+VAT). The Mono/SCSI interface is supplied, as above, for £49 (+VAT).

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RISC OS 3.1 UPGRADES

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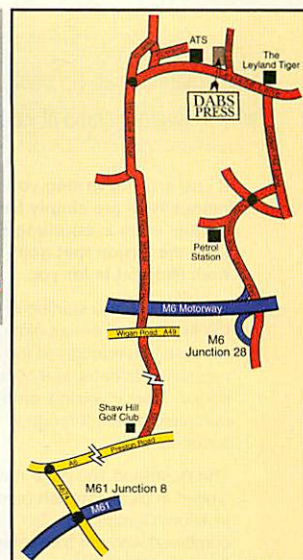
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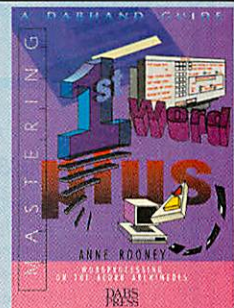
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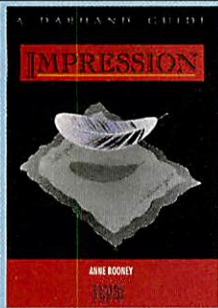
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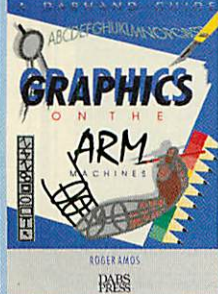
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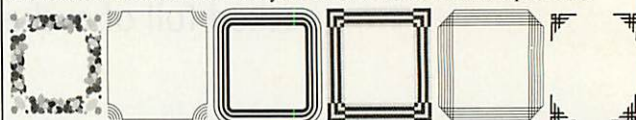
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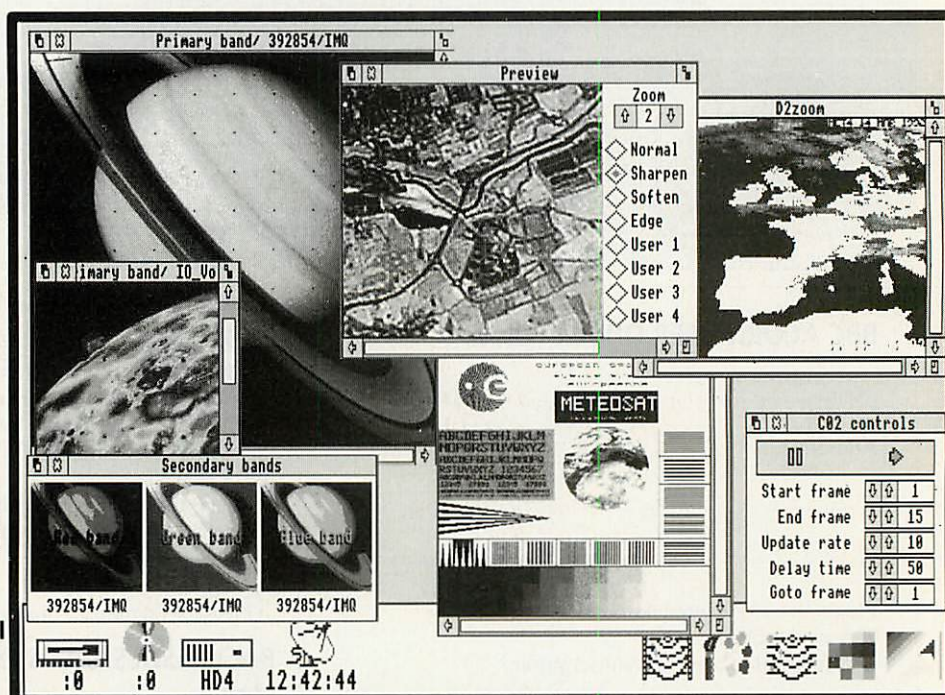
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- A3000, 2Mb Ram, Taxan 775 multiscan colour monitor - £700 ono, also over 30 games and utilities, most half price, also BBC B and disc games - offers welcome. Contact Mr S Weet, Bath. Tel: (0225) 317513
- BBC Master with colour monitor, Philips RGB high resolution - £300 ono. Contact Mrs J Gailey, Middlesex. Tel: (0895) 233798
- Master 512, dual 80-track bridge unit, Mega 3 Rom, Spellcheck, Gem and Dos software, Amstrad printer - £500 ono, will separate. Contact Mr B Cook, Hereford. Tel: (0432) 266069
- BBC B, View, Viewsheets, 16K sideways Ram, Replay, two 40-track disc drives, Olivetti JP101, cassette recorder, lots of software, manuals - £250. Contact A Kimmins, Northants. Tel: (0604) 812478
- I am starting new PD company need loads of PD/shareware, will swap on 1-1 basis, send SAE and software and discs for returned PD to Gem PD, 15 Partridge Down, Winchester, Hants SO22 4HL
- Electron 64K/Turbo, Plus 3, Plus 1, sound expansion, games, View, Viewsheets, books, mags, plus lots more - £200 ono the lot. Contact Mr A Gilfillan, Nottingham. Tel: (0602) 617529
- Wanted: Memoco Electron robotic arm with position feedback and BBC interface card. Contact Mr J Myatt, Stoke-on-Trent. Tel: (0782) 523164
- Master 128, Cumana 40/80 track disc drive, manuals, Wordcraft, Home Office - £170. Contact Mr D Beaumont, Chesterfield. Tel: (0246) 273356
- Easiwriter wanted, will swap Pipedream 3 and Genesis, willing to consider Impression II, genuine reasons. Contact Mr G Anderson. Tel: (0309) 675300
- Star LC200, 9-pin dot matrix colour printer, manuals and Fanfold feed - £110 ono. Contact Mr J Phillips, Kent. Tel: (0732) 454707
- Archimedes 410/1, 4Mb Ram, 20Mb hard disc, colour monitor CM8833, software, PRM, manuals - £550. Contact Mr P Wesson, Oxford. Tel: (0865) 273846
- Wanted: BBC games on cassette, please write (enclosing list and asking prices) to Mr K McCan, 29 Iveagh Crescent, Belfast BT12 6AW
- Master 128, Opus 40/80 disc drive, colour monitor, Citizen 120D, manuals, software, 50 discs, Amx design Rom, Tracker Ball - £450. Contact Mr M Rutland, Sherborne. Tel: (0935) 872517
- BBC B, Watford 32K shadow Ram, Watford DFS, 40/80 track drive, Intersheet, Spellmaster, Star NL10 printer, Sanyo data recorder, no monitor. leads, manuals, games - £150 ono. Please contact K Fletcher, Hants. Tel: (0252) 620866
- Teletex Rom with adapter - £20, Viewsheets Rom, Wordwise Plus Rom, manuals - £10, for BBC B. Contact Mr J Slater, Amptill. Tel: (0525) 840115
- BBC Issue 7, DFS, Aries B32 and B12 boards, Amx mouse and Stop press, exmon II, Sciways, ADI, Watford double plinth, good condition, manuals - £150. Contact Mr L Killip, Sussex. Tel: (0273) 844951
- Wanted: Serious disc software suit Master 128, need disc version of Starfinder by Heather Cooper/Century software, must run on Master 128. Contact R Rose, Cheshire. Tel: 061-439 7506
- Wanted: Urgently BBC Acorn User magazine or monthly cassette or monthly disc (40-track) for BBC B for January 1985. Contact Mr A Webb, Shropshire. Tel: (0746) 761859
- Acorn Electron software and hardware (+1 only), for sale, worth over £800, sell - £300 ono. Contact Mr J Watt, Kent. Tel: (0227) 459452
- Master 128, single 40/80 disc drive and assorted original games - £250, Amstrad DMP 3000 - £75. Contact M Price, Rutland. Tel: (0664) 79629
- Master 128K 65C102 co-processor, Microvitec medium resolution monitor, twin TEAC drives, Roms, manuals, programs - £325. Contact M Robertson. Tel: (0296) 23124
- Electron 32K, Plus1, 5.25in disc drive interface, tape recorder, View, Viewsheets, Rom database, games, all books, offers. Contact Mr A Summerscales, York. Tel: (0347) 22084
- Wanted: A disc copy of Tetris for BBC B. Contact Mr B Ferris, London SE4. Tel: 071-252 9044
- Joystick interface (Leading edge A5000 compatible) Plus 2 Superpro, unused - £42 (cost £62). Contact A Jeffery. Tel: (0278) 751 317
- BBC B, 40/80 track disc drive, DFS, cassette, Cub colour monitor (slight fault), some books - £180. Contact Mr M Milton, Bromley. Tel: 081-467 5427
- BBC Master, disc drive, monitor, printer, mouse, Amx Drive and Page-maker, Spellcheck, Music 5000 synthesiser and 4000 keyboard - £400 ono. Contact D Candish, Salisbury. Tel: (0722) 322977
- BBC B to PC, Torch graduate, 640K, 10Mb hard drive controller, twin floppy drive, Ast six pack, software, manuals - £200 ono. Contact Mr R Burley, Kent. Tel: (0634) 37715
- Scanlight Junior plus Computer Concepts scanner - £95, Vision black/white digitiser external - £39, Deltacat joystick - £15. Contact Mr T Dagger, Blackpool. Tel: (0772) 265421
- 2Mb A310M and colour monitor, 20Mb hard drive, Impression, Pipedream, Pro Artisan, Elite, Lemmings, Saloon Cars and many others - £700. Contact Mr J Quigley, Worthing. Tel: (0903) 204463
- BBC B games discs - £3-£5, tapes - £1-£2, Slave Rom - £5, Micro User 1985-89, Acorn User 1987-91, free. Contact Mr S Hennigan, Kent. Tel: (0634) 201470
- I/O expansion card AKA10 - £50 ono, Poster - £40, Chameleon 2 - £20, Midnight graphics tracer - £20, Cartoon Line - £10, Computer Concepts extra boders disc - £5. Contact Mr J Bancroft, Northants. Tel: (0933) 317562
- Archimedes A310 and stereo monitor, Panasonic dot matrix printer, all boxed up as new, loads and loads of software - £570 ono. Contact Mr R Bielby, Southport. Tel: (0704) 24615
- Wanted: User interface Plus 1 for Acorn Electron. Contact T Jones, Cumbria. Tel: (09467) 28938
- A3000, 4Mb memory, Philips colour monitor, stand, Deltacat joystick, splitter box, much software, all boxed as new - £700 ono. Contact Mr P Taylor, Bradford. Tel: (0274) 674536
- Wanted: 3.5in disc drive for a Master Compact. Contact Mr E Smith, Newcastle-Under-Lyme. Tel: (0782) 615673
- BBC Master 128, colour monitor, disc drive, monitor stand, twin joysticks, Art package and software, excellent condition - £500. Contact Mr N Buckley, Kings Lynn. Tel: (0553) 673027 after 6pm
- Panasonic KX-P108 9-pin printer - £100, The Real McCoy - £15, Nevryon, Drop Ship, Speech, Apocalypse - £10 each, Tracker (music) - £30. Contact Mr N Maddock, Middlesex. Tel: (0895) 231011
- Electron accessories, Acorn Plus 1, joysticks etc - £25, Plus 3 3.5in disc drive - £40, books - £10, 70+ games - £50, all - £110. Contact Mr T Smith, Essex. Tel: (0376) 329687
- Master 128, colour monitor, double disc drive with power supply unit, Viewstore and Master Rom, extras - £350. Contact Mr A Ross, Nottingham. Tel: (0602) 654002
- Watford A3000 I/O card - user/analogue/11C - £35, Watford 20Mb IDE hard disc drive (internal) - £150. Contact Mr V Robertson, Westhill. Tel: (0224) 743733
- Wanted: Archimedes contacts from all over the world to swap PD, 100% reply. Contact Mr R Barkhuysen, Elderenweg 11, 3770 Riemst-Millen, Belgium.
- Due to the huge backlog of free ads, there is no coupon this month. Please do not send in any ads until the coupon reappears. Normal service will be resumed as soon as possible.

THE ColourCard

FOR THE ARCHIMEDES

MORE RESOLUTION
MORE COLOURS
MORE SPEED
LESS FLICKER



HATS OFF TO COLOURCARD



A new graphics accelerator card for the Archimedes, the ColourCard brings a host of improvements to the video capabilities of any Archimedes A300*, 400*, 540 or 5000 series computer.

The simple to fit, single width expansion card is completely compatible with all RISC OS desktop software, but brings much higher screen resolutions at higher screen refresh rates (less flicker and easier on the eye).

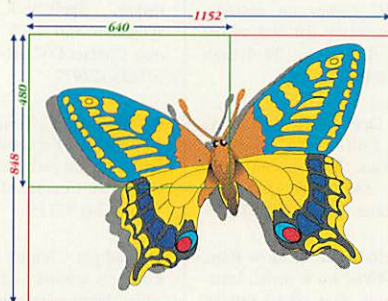
In 16 and 256 colour screen modes all the colours are selectable from 16 million hues. This means scanned pictures can be seen with 256 true grey-levels on screen and that you are no longer restricted to the preset Acorn palette. Some applications, such as ArtWorks, can provide better screen colouring using the new palettes.

In addition, the ColourCard offers 15 bit-per-pixel true colour screen modes having over 32,000 colours on screen at once. Although these screen modes are not yet desktop software compatible, it is expected that programs will become available that take advantage of the modes. The ColourCard is supplied with a 24-bit preview utility to show 24-bit Clear files in stunning full colour.

The ColourCard reduces the load on the main Archimedes memory and so allows the ARM processor to run much faster than would normally be possible in high resolution screen modes. Depending on machine and screen mode, graphic operations can be up to twice as fast.

The ColourCard revolutionises DTP and graphics work, and opens up the world of true-colour graphics to the Archimedes user for the first time.

The ColourCard has been developed and is backed by



ColourCard offers 3 times the pixel area of standard Acorn VGA mode 27.

the largest and most successful Archimedes developer. It is available now, and for added peace of mind comes with a 14-day, no quibble money back guarantee.

KEY COLOURCARD FEATURES:

ArtWorks version 1.1 now supports 32,000 ColourCard screen modes

Video pass through for guaranteed compatibility with all software without having to unplug your monitor

15 bpp (ie 32,000 colour) screen modes

No quibble money back guarantee

A3000 version now available

New configurable screen update speed

(The ColourCard is compatible with all multi-scanning monitors. *Only higher scanning rate monitors can manage 1152 x 848 resolution. Lower scanning rate monitors may display some resolutions at lower refresh rates. *A300 and early A400 computers may need an additional Genlock connector to be fitted internally.)

Price £249.00 +£6 p&p + vat (£299.62 inc)
Available from all good dealers and from:



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Tel: 091 519 1455 Fax: 091 510 1929



Computer Concepts Ltd
Gaddesden Place, Hemel Hempstead,
Herts, HP2 6EX
Tel: 0442 63933 Fax: 0442 231632

E&EO Details are subject to change without notice.

| SOME OF THE SUPPORTED SCREEN RESOLUTIONS | | |
|--|------------|-------|
| 16 colours | 1600 x 600 | 65Hz |
| | 1024 x 768 | 72Hz |
| | 1152 x 848 | 64Hz* |
| | 1280 x 512 | 80Hz |
| 256 colours | 800 x 600 | 85Hz |
| | 1152 x 424 | 80Hz |
| | 800 x 300 | 80Hz |
| 32,000 colours | 576 x 424 | 90Hz |

IMPROVE YOUR MEMORY

However much memory you have it's never enough. David Lawrence looks at options for 8Mb of Ram on the A5000

More and more applications these days are only comfortable with 2Mb of memory, making 4Mb a must for many users. It is a well-known fact that junk expands to fill available space – just look in your attic for proof. This law also seems to apply to programs and computer memory. This may be a little pessimistic, but sometimes even 4Mb isn't enough, especially with 600dpi printouts. Two 8Mb expansions now exist for A5000s: both require the Memc to be removed from the main circuit board and replaced by a socket. The two suppliers: Risc Developments and Atomwide each offer their own options.

RISC DEVELOPMENTS

This consists of two cards. One contains all the DRam and it plugs into the memory expansion slot in the usual way. The second card contains the two Memcs necessary to handle the 8Mb; this plugs into the new Memc socket on the main board at one end and the Ram card at the other. A handful of glue chips provide the necessary synchronisation between the two Memcs. Two versions of the upgrade exist, depending on whether you have 2Mb or 4Mb of memory.

Although fitting takes two days, if you can't stand this period of separation, you can always turn up at Risc Developments' door and the people there should be able to perform the necessary surgery in a couple of hours – just enough time to see the sights of St Albans. Alternatively, and this is mainly aimed at foreign customers, it will supply a self-fit version. This involves delicate de-soldering so, ideally, get a qualified service engineer to do the work.

ATOMWIDE

Since the arrival of the A5000, Atomwide has been producing 8Mb boards to complement its 4Mb ones, but a new design has just been launched; this is the upgrade covered here. As with the Risc Developments upgrade, two

boards are supplied: a Memc header card, containing the Memcs and a couple of synchronisation Pals, and a Ram card.

The header card plugs into the Memc socket but the main difference between the two products is that the Ram card plugs into the Rom sockets (the Roms themselves are removed and plugged into the Ram card). This means the extra 4Mb should function with most existing 2Mb machines upgraded to 4Mb (the card being plugged into the memory expansion slot). The two cards are connected with a 34-way, interleaved earth, ribbon cable. This new-style 8Mb design can also be installed in any pre-A5000, 4Mb machine by changing the Ram card; this will cost you £399. This also allows Risc OS 3 Roms to be installed in early machines.

CONCLUSION

Both upgrades are well-made and come from well-known companies. At the time of writing, Atomwide's is cheaper, but I suspect Risc Developments may well lower its price to match. However, in terms of performance there is little to choose between them.



ILL: JONNY MENDELSON Photo: RAPID EYE

PRODUCT DETAILS

Product: A5000 8Mb upgrade
Supplier: Risc Developments
Tel: (0727) 840303
Prices: 2 to 8Mb upgrade £499
4 to 8Mb upgrade £429
If you already have an upgrade from 2Mb to 4Mb with a Risc Developments or Acorn board, there is a £60 trade-in. Carriage £8

Supplier: Atomwide
Tel: (0689) 838852
Price: 2 to 8Mb upgrade £449
4 to 8Mb upgrade £399 (with any third-party 4Mb)
If you already have an old style Atomwide expandable card; 4 to 8Mb only costs £359
Carriage is included.

All prices exclude VAT

Watford Electronics Ltd

Established 1972

Mail Order & Showroom: Jessa House, Finway, off Dallow Road, Luton, LU1 1TR, England

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Archimedes micro

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| A3010-1Mb Family | £424 | £625 | £769 |
| A3010-2Mb L/C | — | £680 | — |
| A3020-2Mb FD | — | £749 | £799 |
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| A4000-2Mb HD80 | — | £949 | £999 |
| A4000-Home Office | — | £999 | £1049 |
| A5000 No HD | £689 | — | — |
| A5000-2Mb HD80 | — | £— | £1399 |
| A5000-L/C 2Mb HD80 | — | — | £1445 |
| A5000-4Mb HD120 | — | — | £1599 |
| A5000-2Mb ES | — | — | £1299 |
| A5000-2Mb NS | — | — | £1399 |
| Pocket Book | £212 | — | — |
| Pocket Book Class | £2127 | — | — |

On-Site Maintenance now available on all Archimedes Micros. Please telephone for details.

Archi A4 Notebooks

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| A4 Notebook with 2Mb RAM | £1399 |
| A4 Notebook 4M RAM/60M HD | £1699 |

FREE OFFER

When you purchase any of the above Archimedes Micros, we will give 10% of the value of the machine in Hardware or Software of your choice

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| Acorn JP150 Ink Jet Printer | £199 |
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Archi Accessories

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| • 5.25" 800K external Floppy Drive | £80 |
| • Acorn I/O Podule (Analogue/User/1MHz bus) | £79 |
| • I/O Podule (Analogue/User) | £59 |
| • MEMC 1A Upgrade | £29 |
| • MIDI add-on to Acorn I/O Podule | £27 |
| • MIDI Expansion Card | £65 |
| • Econet Network Board | £38 |
| • Archi replacement mouse - New design | £29 |
| • PC Emulator | £95 |
| • Floating Point Unit | £455 |
| • Keyboard Extension Lead | £6 |
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| • 4 Podule Backplane | £25 |
| • Fan for above backplanes | £10 |
| • Risc Os Extras Software Disc | £5 |
| • Ethernet Card | £149 |
| • SCSI Card 8 bit | £129 |
| • SCSI Card 16 bit | £149 |
| • SID Utilities Discs - Set of 4 | £19 |
| • ST506 Hard Disc Controller Card | £99 |
| • A5000 Dust Cover | £9 |
| • A5000 Technical Reference Manual | £65 |
| • A4 Spare Batteries | £49 |
| • IDE ROM Upgrade for use with RISC OS3 | £20 |
| • CC Faxpack | £289 |
| • Colour Card | £239 |

RISC OS 3 Upgrades

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| • A 5000 Software Upgrade Kit | £16 |
| • Software Upgrade Kit for the rest | £40 |
| • Hardware Upgrade Kit 300/440 | £25 |



Watford Electronics Headquarters - Luton

Scan256 Grey Scale Scanning

If you need a 256 grey-scale hand scanner for your Archimedes then look no further. Scan256 gives you up to 256 levels of grey at a maximum of 400dpi and is supported by state-of-the-art sophisticated software - for only £185. This makes it the only sensible scanning and image processing solution for the Acorn 32-bit range. Just compare these features:

- More than one copy of the image held in memory at once.
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- True brightness, contrast and gamma correction.
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- Plus much much more...

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Supplied with 3.5" Floppy Disc Drive and a mouse, Colour Monitor and lead, TV modulator, 20Mb fast IDE Hard Disk Drive, 'Compression' utility to increase the Hard Drive capacity to typically 40Mb, the highly acclaimed Computer Concept's Impression Junior DTP package, EasiWord wordprocessor, Quest for Gold game, applications suite of software packages and comprehensive audio training tape.

RRP: £1095

Sale Offer Price: £739

- A3010 DTP Pack with Learning Curve **£839**
- Additional 1Mb RAM fitted **£39**

Special Education discounts available on micros, RAM upgrades, ARM 3 Turbo Card, etc. Please write in or telephone:

0582 48 77 77

A3000 Accessories

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| • 3.5" External Drive | £95 | • Monitor Stand | £15 |
| • Technical Manual | £39 | • Serial Upgrade | £19 |
| • A3000 Dust Cover | £5 | • Micro+monitor cover | £9 |
| • Acorn Carrying Case for A3000 | £10 | | |
| • A3000 User Port/Midi Upgrade Card | £44 | | |
| • A3000 User/Analogue/IIC I/O Card | £38 | | |
| • A3000 External Podule Case | £15 | | |

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

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| • R300-4 Layer RAM upgrade board (Bare) | £25 |
| • R302-A3000 - to 2MB RAM Upgrade | £29 |
| • R303-A3000 - to 2MB RAM Upgrade (expandable to 4MB) | £49 |
| • R304-A3000 - to 4MB RAM Upgrade | £99 |
| • R305-A3010 - to 2MB RAM Upgrade | £39 |
| • R306-A3020 - to 4MB RAM Upgrade | £70 |
| • R311-A305 - to 1MB RAM Upgrade | £30 |
| • R312-A305/310 - to 2MB RAM Upgrade | £85 |
| • R314-A305/310 - to 4MB RAM Upgrade | £229 |
| • R412-A410/1 - to 2MB RAM Upgrade | £25 |
| • R413-A420/1 - to 4MB RAM Upgrade | £50 |
| • R414-A410/1 - to 4MB RAM Upgrade | £75 |
| • R810-A410/1 - to 8MB RAM Upgrade | £399 |
| • R820-A420/1 - to 8MB RAM Upgrade | £375 |
| • R840-A440/1 - to 8MB RAM Upgrade | £315 |
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| Graphic Writer | £20 | Wordz | £85 |

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| Magpie | £40 | Pinpoint Junior | £23 |

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Acorn Multimedia

Multimedia Expansion £499
Multimedia Expansion + 16 bit SCSI

Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.

Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine.

A powerful security feature has been provided with the two unique commands *IDELOCK and *IDEUNLOCK, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The IDEForm Write Protect option is particularly useful in conjunction with *IDELOCK as it will prevent any unauthorised deletion of data.

By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- IDEForm, WIMP based configuration and formatting software
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- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- IDEFSDisk, creates PC emulator hard discs

Prices

| Part No. | Capacity | Access Speed | Price |
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| ADA 0520 | 44Mb | 28mS | £189 |
| ADA 0530 | 100Mb | 16mS | £259 |
| ADA 0570 | 200Mb | 15mS | £369 |
| ADA 0580 | 330Mb | 15mS | £599 |

All above 3.5" Drives are supplied complete with Controller Card & cable for use with A300/A400/A500 series machines.

| | |
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| AAA 0300 External Case & PSU for A3000 | £85 |
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A5000 Internal IDE Drive

| | | | |
|----------|-------|------|------|
| ADA 0940 | 100Mb | 16mS | £195 |
| ADA 0950 | 200Mb | 15mS | £275 |
| ADA 0580 | 330Mb | 15mS | £525 |
| ADA 1030 | 80Mb | 17mS | £189 |

A5000 2nd Internal IDE Hard Drive

| | | | |
|----------|-------|------|------|
| ADA 0960 | 100Mb | 16mS | £205 |
| ADA 0970 | 200Mb | 15mS | £285 |
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| ADA 1040 | 80Mb | 17mS | £195 |

Internal Hard Disc Drives for A3000/A3010

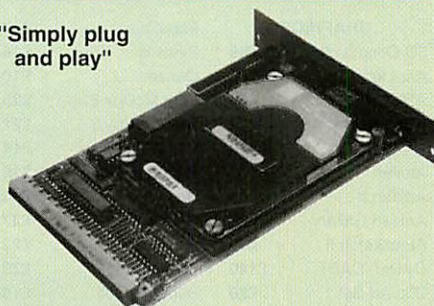
State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

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Supplied ready assembled. No soldering required. Simply plug into the allotted space.

Archi IDE Hard Cards

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Watford's easy to instal, low cost, high performance, revolutionary IDE Hard Cards for the A300 & A400 series Archimedes.

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(All above Hard Cards can be used as Removable Hard Drives. Ideal for Military and Education use.)

Archi to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version also available (please specify)

- For A3000 £15
 - For A5000 £16
- For A3000 Serial Upgrade (£19) required

Cortian CKAI Interface

Eliminates need to have a User port in A3000/305/310/400/540 when using Concept Keyboard. £29

Concept Keyboards

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- A4 Designer Pack £110
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- A3 Primary Pack £105
- A3 Designer Pack £110
- Universal 2010 Keyboard A3 £115
- Universal 2010 Keyboard A4 £110

A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

Features

- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices. £38



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Leasing finance at very attractive rates now available to Businesses (subject to status), Schools, Colleges, Universities, Government Depts. and Local Councils. Minimum order £1,000. Please telephone for details.

Archimedes External Disc Drive Interface

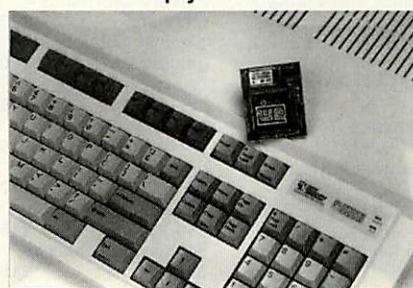
With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Up to 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead. Price £21

Back Plate Extension

- A300/400 £15;
- A3000 £14

ARM 3 Turbo Card MkII

Simply The Best



Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £145. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.

Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £24.

(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Special Offer £145

Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

BBC/Master Accessories

| | |
|--|--------------|
| Econet Module for the Master | £42 |
| Twin ROM Cartridge for Master | £9 |
| Quad ROM Cartridge for Master | £14 |
| Master Reference Manual I | (No VAT) £14 |
| Master Reference Manual II | (No VAT) £14 |
| Master Advance Ref Manual | (No VAT) £14 |
| 64K Upgrade Kit for B+ | £32 |
| ECONET Upgrade Kit for BBC B | £42 |
| ALL ECONET UPGRADES Available | |
| ARIES' IEEE Interface for BBC B & Master | £238 |

Low Cost Finance now available, subject to status. For further details, please contact our sales team.

Continued → → → → → → → → →

BBC Education Software

| | | |
|--|--|-----|
| A vous la France | French programs for beginners | £29 |
| Au restaurant/Accident de route | French games for 12 years + | £26 |
| Bolougne and oh les | French program for beginners | £26 |
| Computer control | Program simulating computer control | £26 |
| Computers at work | Primary education program | £17 |
| Espana Viva | Spanish educational programs | £20 |
| Folks Tales | Listening and reading for ages 7+ | £22 |
| Geordie Racer | Look and read for ages 7+ | £22 |
| Hall of Mirrors | Practice word & number skills | £22 |
| Help your child learn basic mapwork 2 | | £18 |
| Inside Science | Four common science subjects | £22 |
| Letters and pictures | Educational programs for 6-8 years | £15 |
| Make a wildlife garden | Explore wildlife/weather/garden growth | £22 |
| Maths with a story 1 | Primary level maths programs | £20 |
| Maths with a story 2 | 4 further maths programs | £20 |
| Note invaders | Learn sheet music for 7-Adults | £15 |
| Numbers & Pictures | Early number learning (4-6 years) | £15 |
| Picture craft | Geometrical design & Colouring | £17 |
| Puncman 1 & 2 | Learning Punctuation (7-13 years) | £15 |
| Puncman 3 & 4 | Learning Punctuation (8-14 years) | £15 |
| Puncman 5, 6 & 7 | Learning Punctuation (8-15 years) | £15 |
| Ramayana Tales | Simple Desktop Publisher using pictures & characters from the Ramayana | £22 |
| Skyhunter | Look and read educational adventure | £22 |
| Technology and design | Problem solving programs | £22 |
| Through the dragons eye | Adventure game and Map reading | £22 |
| Fun School 3 (Under 5) | Varied range of Education subjects | £17 |
| Fun School 3 (5-7) | Varied range of Education subjects | £17 |
| Fun School 3 (Over 7) | Varied range of Education subjects | £17 |

Archi Educational Software

| | | | |
|------------------------------------|-----|---------------------------------------|-----|
| • 10 out of 10 Early essentials | £20 | • Gate Array Teaching System | £68 |
| • 10 out of 10 English | £20 | • Glimpse Clip Art Utility (7-16 yrs) | £8 |
| • 10 out of 10 Maths | £20 | • Highlighter (6-16 yrs) | £42 |
| • Animated Alphabet (3-6 yrs) | £21 | • Jigsaw | £19 |
| • Arcventure (8-12 yrs) | £29 | • Mapventure (9-13 yrs) | £24 |
| • Bookbinder | £43 | • Microbugs | £24 |
| • Bumper Disc | £14 | • Money Matters | £16 |
| • Bumper Disc 2 | £14 | • Nature Park Adventure (7-9 yrs) | £27 |
| • Craftshop 1 | £19 | • Numerator | £60 |
| • Craftshop 2 | £19 | • Picture Book | £16 |
| • Converta-Key | £16 | • Recall (6-13 yrs) | £39 |
| • Data Word | £16 | • Sellardore Tales | £24 |
| • Desktop Stories | £35 | • Snippet | £36 |
| • DigiSim | £35 | • Space Mission Mada (9-13 yrs) | — |
| • Dream Time (5-7 yrs) | £23 | • Sting of the Dump (9-13 yrs) | £22 |
| • Farm (5-7 yrs) | £19 | • Viewpoints (9-12 yrs) | £33 |
| • Fleet Street Phantom (9-13 yrs) | £25 | • Wizard's Revenge (7-10 yrs) | £17 |
| • Fun School 3 Red (up to 6 years) | £17 | • Worst Witch (7-10 yrs) | £25 |
| • Fun School 3 Green (6-8 years) | £17 | | |
| • Fun School 3 Blue (8 years +) | £17 | | |

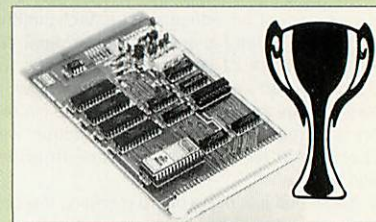
Archimedes Software

| GRAPHICS | | Populous | |
|-----------------------|------|---------------------------|------|
| 3D Construction Kit | £39 | Pysanki | £14 |
| Arc Light | £46 | Quazer | £10 |
| ARCTist | £19 | Real McCoy 2 | £23 |
| ARCTiculate | £19 | Real McCoy 3 | £22 |
| Art Works | £129 | Redshift | £14 |
| Atelier | £60 | Return to Doom | £16 |
| Artisan II | £45 | Repton 3 | £14 |
| Artisan Gallery | £16 | Saloon Cars Deluxe | £27 |
| Autosketch II | £65 | Sim City | £22 |
| CADet (CAD) | £140 | Spitfire Fury | £22 |
| Clip Art Set 1 | £28 | Superior Golf | £14 |
| Clip Art Set 2 | £28 | Superpool + Break 147 | £22 |
| Concept Designer | £23 | Swiv | £19 |
| Craftshop 1 & 2 | £28 | Talisman | £12 |
| Euclid 2 | £50 | Techodream | £20 |
| Graph Box | £59 | Trivial Pursuit | £22 |
| Graphbox Professional | £107 | Twin World | £15 |
| HotLink Presenter | £40 | U.I.M. | £23 |
| Illusionist | £69 | White Magic 2 | £15 |
| Kermit | £46 | Worldscape | £16 |
| Mogul | £17 | XFire | £19 |
| PCAD Educ. | £395 | Zelanites | £23 |
| Poster | £75 | | |
| Pro Artisan | £70 | Miscellaneous | |
| ProCAD | £475 | Ancestry | £59 |
| Prime Art | £46 | Arccomm 2 | £38 |
| Render Bender 2 | £79 | Arcterm 7 | £64 |
| Revelation 2 | £80 | Armadeus Sound | £60 |
| Titler | £119 | Avante Garde Fonts | £23 |
| Tween | £29 | Battle Chess | £25 |
| | | BBC DFS Reader | £6 |
| | | Broadcaster Loader | £65 |
| | | Chameleon | £34 |
| | | Chart Well | £25 |
| | | Chatter | £34 |
| | | Compression (CC) | £38 |
| | | Craftshop 1 | £27 |
| | | Craftshop 2 | £27 |
| | | Desk Edit 2 | £29 |
| | | Equasor | £38 |
| | | FlexiFile | £97 |
| | | Genesis | £10 |
| | | Genesis Plus | £68 |
| | | Genesis 2 | £99 |
| | | Investigator 2 | £22 |
| | | Magpie 2 | £42 |
| | | Notate | £42 |
| | | Numerator | £66 |
| | | Pin Point | £65 |
| | | Polyglot | £16 |
| | | Presenter 2 | £29 |
| | | Presenter Story | £145 |
| | | Prophet Accounts | £132 |
| | | Prophet Demo Disc | £10 |
| | | Rainforest | £17 |
| | | Revelation 2 | £95 |
| | | Rhapsody in Blue 2 | £45 |
| | | Score Draw | £46 |
| | | Show Page | £127 |
| | | Speech! | £15 |
| | | The Victorian | £17 |
| | | Time Tabler | £549 |
| | | Toolkit (Ciares) | £35 |
| | | Touchtype | £40 |
| | | Tracker | £39 |
| | | Turbo Driver BJ10E | £42 |
| | | Type Studio | £43 |
| | | Vox Box | £46 |
| | | Wimp Programmer's Toolkit | £16 |
| | | WorldScope | £17 |
| GAMES | | LANGUAGES | |
| Air Supremacy | £17 | Desktop C | £199 |
| Apocalypse | £14 | Macro Assembler | £40 |
| Arcade 3 Compilation | £12 | Robo Logo | £69 |
| Battletank | £10 | BASIC Compiler | £77 |
| Black Angel | £27 | Logotron Logo | £45 |
| Boogie Buggy | £14 | Risc BASIC | £120 |
| Break 147 + Supa Pool | £19 | Risc FORTH | £110 |
| Bughunter in Space | £12 | Cambridge Pascal | £95 |
| Cataclysm | £19 | | |
| Caverns | £10 | | |
| Champions | £25 | | |
| Chess 3D | £16 | | |
| Chocks Away | £27 | | |
| Compendium | £32 | | |
| Chocks Away Extra | £14 | | |
| Chuck Rock | £18 | | |
| Conqueror | £15 | | |
| Cyber Chess | £38 | | |
| Cycloids | £20 | | |
| Ego Repton 4 | £— | | |
| Elite | £33 | | |
| Enter the Realm | £19 | | |
| E-Type Compendium | £20 | | |
| E-Type Designer | £13 | | |
| Fervour | £35 | | |
| Galactic Dan | £19 | | |
| Gods | £24 | | |
| Grievous Bodily Arm | £19 | | |
| Hero Quest | £25 | | |
| Holed Out Designer | £13 | | |
| Holed Out Golf Comp | £20 | | |
| Inter Dictor 2 | £26 | | |
| Iron Lord | £15 | | |
| Jahangir Khan Squash | £19 | | |
| Lemmings | £20 | | |
| Oh no more Lemmings | £15 | | |
| Lost Temple | POA | | |
| Lotus Turbo Challenge | £19 | | |
| Mad Prof Mariarti | £17 | | |
| Masterbreak | £16 | | |
| Man at Arms | £14 | | |
| MahJong Patience | £15 | | |
| Manchester United II | £19 | | |
| Nebullus | £21 | | |
| Nevryon II | £20 | | |
| Omar Sharif's Bridge | £23 | | |
| Pandoras Box | £18 | | |
| Pipe Mania | £17 | | |
| Play It Again Sam | £— | | |

BBC/Master Games

| | | | |
|---------------------|-----|-----------------------|-----|
| Acornsoft Hits 1 | £10 | Sim City | £10 |
| Acornsoft Hits 2 | £10 | Superior Collection 1 | £10 |
| Air Supremacy | £10 | Superior Collection 2 | £10 |
| Play It Again Sam 1 | £10 | Play It Again Sam 9 | £10 |
| Play It Again Sam 2 | £10 | Play It Again Sam 10 | £10 |
| Play It Again Sam 3 | £10 | Play It Again Sam 11 | £10 |
| Play It Again Sam 4 | £10 | Play It Again Sam 12 | £10 |
| Play It Again Sam 5 | £10 | Play It Again Sam 13 | £10 |
| Play It Again Sam 6 | £10 | Play It Again Sam 14 | £10 |
| Play It Again Sam 7 | £10 | Play It Again Sam 15 | £10 |
| Play It Again Sam 8 | £10 | Play It Again Sam 16 | £10 |

Archi Real-Time Digitiser



Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £75

A Set of Colour Filters for colour image grabbing using a video camera £16

Archi Graphic Tablet



Special Price £199

(Price includes Tablet, Leads, Software & Puck) Stylus Optional Extra £20

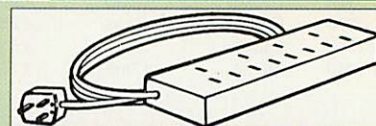
Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus £105

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage transient spikes/surges caused by lightning or thermostats switching.

Protection for only £8.50

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

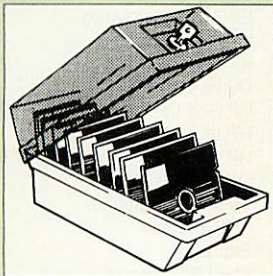
£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

Antistatic Lockable Disc Storage Units



- **M35** – holds up to 50 5.25" discs £4.95
- **M85** – holds up to 95 5.25" discs £6.95
- **M25*** – holds up to 25 3.5" discs £4.95
- **M50** – holds 50 3.5" discs £6.50
- **M100** – holds 100 3.5" discs £6.99
- **M10** – holds 8 of No. 10 Data Cartridges £15

* Not lockable

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

£2

3M – Diskettes

Lifetime warranty on 3M Discs

- 10 x 5.25" S/S D/D 40T (744) £5
- 10 x 5.25" D/S D/D 40T (745) £5
- 10 x 5.25" S/S D/D 80 Track (746) £6
- 10 x 5.25" D/S D/D 80 Track (747) £7
- 10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT £8
- 10 x 3.5" S/S D/D 40/80 Track £6
- 10 x 3.5" D/S D/D 40/80 Track £6
- 10 x 3.5" Double Sided High Density £10

Top Quality Diskettes

Watford's life time guaranteed disc are supplied complete with self stick labels & plastic library case.

- 10 x **M3** 3.5" D/S D/D 80 Track £6
- 10 x **M9** 3.5" D/S High Density £10
- 10 x **M4** 5.25" S/S D/D 40 Track £5
- 10 x **M5** 5.25" D/S D/D 40 Track £5
- 10 x **M7** 5.25" D/S D/D 80 Track £6
- 10 x **M8** 5.25" D/S H/D Hi-Density £9

Special Bulk Offer Discs

(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

| Type | S/S 40T | D/S 40T | D/S 80T |
|-------------------------|------------|-------------|---------|
| • Without Sleeves 5.25" | £25 | £30 | £35 |
| • With Sleeves 5.25" | £28 | £33 | £38 |
| • 3.5" D/S D/D | £21 for 50 | £39 for 100 | |
| • 3.5" D/S H/D | £40 for 50 | £75 for 100 | |

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single £3.00; Dual £3.75

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single £4 Twin £6

3.5" Disc Drive

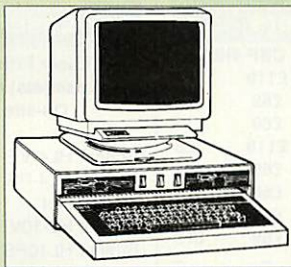


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

| Type | Description | |
|-----------------|----------------------------|------|
| • CLS35: | Single Disc Drive, 400K | £59 |
| • CLD35: | Twin Disc Drives, 800K | £109 |
| | Disc Drive with PSU | |
| • CS35: | Single Disc Drive, 400K | £82 |
| • CD35: | Twin Disc Drives, 800K | £126 |

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



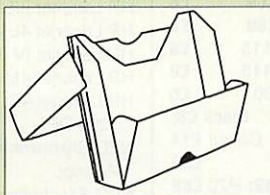
- **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£150

- **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£145

Plastic Library Cases



- DLC1** – Holds 5 x 3.5" Discs. £1.50
- DLC2** – Holds 10 x 3.5" Discs. £1.90
- DLC3** – Holds 5 x 5.25" Discs. £1.60
- DLC4** – Holds 10 x 5.25" Discs. £2.00

Disc Albums

Attractively finished in leather-look PVC Vinyl

- DW1** – Holds 6 x 3.5" Discs £2.50
- DW2** – Holds 6 x 5.25" Discs £3.00
- DW3** – Holds 20 x 5.25" Discs £3.50
- DW4** – Holds 40 x 3.5" Discs or 5.25" Discs £4.50

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Acorn & Watford DFSs

- Watford sophisticated DFS ROM £16.00
- Watford DFS Kit complete £49.00
- DFS Manual (comprehensive) £6.95
- Acorn DNFS ROM £17.00
- Acorn ADFS ROM only £25.00
- Acorn 1772 DFS ROM Kit £49.00
- Acorn DFS Kit complete £48

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1772 DFS, plus many more added features.

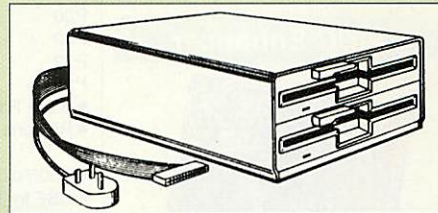
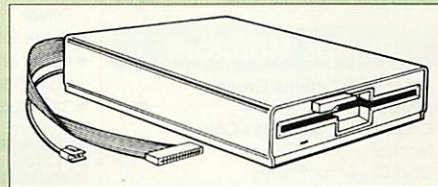
- Complete Kit Special Price £44
- DDFS Manual (No VAT) £6.95

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"



Our Disc Drives conform to BS415

| Type | Description | |
|-------------------|--|------|
| | Disc Drive without PSU | |
| • CLS400S: | Single, 40/80 track 400K Double sided Drive | £70 |
| • CLD800S: | Twin, 40/80 track, 800K Double sided Drives | £138 |
| | Disc Drive with PSU | |
| • CS400S: | Single, 40/80 track, 400K Double sided Drive | £80 |
| • CD800S: | Twin, 40/80 track, 800K Double sided Drives | £149 |

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Continued → → → → → → → → →

Microvitec Monitors

- 1431 - Standard Resolution Monitor **#£175**
 - 1451 - Medium Resolution Monitor **#£215**
 - Cub3000 Medium Res for A3000 **#£195**
 - Dust Cover for Microvitecs **£5.50**
 - Touchtec 501 Touch Screen **£239**
 - Touchtec 3000 **£-**
- # Includes 3 years parts & labour warranty

Multiscan Colour

- Eizo F550i **£749**
- Eizo T560IT **£1345**
- Eizo T660i-T 20" **£1655**
- Eizo 9060 **£398**
- NEC 2AN **£269**
- NEC 3FG **£350**
- NEC 4FG **£517**
- NEC 5FG **£975**
- NEC 6FG **£1739**
- Taxan 787 **£238**
- Taxan 787LR **£265**
- Taxan 795PC **£465**
- Taxan 875+ **£729**
- Taxan 875+ LR **£799**
- Taxan 970 **£1225**
- VIDC Enhancer **£25**

Aries AlphaScan Monitor

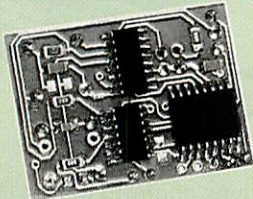
Its multiscan circuitry provides automatic adjustment for frequencies between 31 and 56KHz horizontal, and 43 and 70Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The VIDC Adaptor supplied with the monitor allows high resolution operation in all screen modes. **£325**

- Aries Alphascan 17" Plus **£585**

Philips Monitors

- BM7502 12" Hi-res Green Monitor **£88**
- CM8833 14" Med. Res Colour Monitor **£195**
- Dust Cover for Philips Monitors **£6**
- Spare Monitor Leads (various) **£7**

VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A Desk Top application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: Its unique design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

Integrex Ink Jet Printers

- Colour Jet 132 Printer **£425**
- Paper Roll **£6.50**
- BBC Screen Dump Software **£10**
- Colour Cartridge **£21**
- Black Cartridge **£12.40**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**
- Colour Jet 2000 **£599**
- Betajet Ink Jet Printer **£185**
- Betajet Cut Sheet Feeder **£43**
- Integrex Colourjet Series 2 **£335**
- Auto Sheet Feeder for Series 2 **£45**

Printer Leads

- BBC Centronics 4' £5; 6' £6
- Archi Parallel 2m £5; 5m £9; 10m £13
- PC Parallel 2m £5; 5m £9; 10m £13
- 25 pin D Male/Male 2m £5; 5m £10
- Centronics Double Ended 4' £5
- Centronics Double Ended 6' £6
- RS232 Leads Various **£POA**

Star Printers

- | Printer | CSF | Ribbon |
|-------------|------|--------|
| LC15 | £190 | £119 |
| LC20 | £104 | £69 |
| LC100C | £126 | £69 |
| LC24-15 | £245 | £119 |
| LC24-100 | £143 | £69 |
| LC24-20 Mk2 | £169 | £69 |
| LC24-200C | £214 | £69 |
| LC200 C | £151 | £69 |
| SJ-144 | £POA | - |
| STAR JET | £169 | £43 |
| XB24-200C | £324 | £80 |
| XB24-250C | £389 | £139 |
| ZA-200C | £260 | £- |
| ZA-250C | £324 | £- |
- # Includes 12 months on-site warranty

- Star/Archimedes Colour Printer Driver **£15**
- Black Ribbons for Colour Printers **£5**
- Serial 8K Serial Interface **£52**
- LC10/15/24/200 **£52**
- 32K Buffer LC/XB24-10; 15; 200 **£52**

NEC Pinwriter Printers

- | Printer | CSF | Ribbon |
|---------|------|--------|
| P220 | £189 | £59 |
| P30 | £235 | £59 |
| P62 | £342 | £89 |
| P72 | £406 | £115 |
| P90 | £579 | £115 |
- Black Ribbons for P20; P30 **£6**
 - Ribbons for P60/70/P90 **Black £8; Colour £14**
 - P60/70 Colour Option Kit **£59**
 - CSF for P20 **£59; P60 £89; P70 £89**

Panasonic Printers

- | Printer | CSF | Ribbon |
|-----------|-------|--------|
| KX-P1123 | £126 | £59 |
| KX-P1170 | £98 | £59 |
| KX-P1624 | £264 | £126 |
| KX-P1654 | £330# | £126 |
| KX-P1695 | £267 | £126 |
| KX-P2123M | £144 | £79 |
| KX-P2123C | £194 | £79 |
| KX-P2124 | £215 | £89 |
| KX-P2180M | £126 | £79 |
| KX-P2180C | £143 | £79 |
| KX-P2624 | £269# | £126 |

- # Includes 12 months on-site warranty
- Dustcover for 80 column printers **£6**
 - Serial Interface for above Printers **£46**
 - Black Ribbons for P1081, 1180, 1124 **£6**
 - Brown, Blue or Red Ribbons for KX-P1081/1592/1595/1695 **£9 each**
 - 32K Buffer for above Printers **£16**

P.S. We only sell original Panasonic Ribbons which are guaranteed to last 3 million characters

Citizen Printers

- 120D+ **£98**
 - Swift 9 **£145**
 - Swift 9X **£185**
 - PN-48 **£189**
 - ProJet **£299**
 - Swift 200 **£178**
 - Swift 240 **£200**
 - Swift 240C **£212**
 - Swift 24X **£299**
 - AH29804 Manual Cut Sheet Feeder for Swift 9/24/124. Holds 50 Sheets **£29**
 - Cut Sheet Feeder for 80 col. printers **£75**
- + FREE 2 years Parts and Labour warranty on all Citizen Printers

- Swift 9 Colour Option **£19**
- Swift 24 Colour Option **£29**
- Swift 24 Ribbons **Black £4 Colour £13**
- Swift 24X Ribbons **Black £8 Colour £16**
- Citizen/Archimedes Colour Printer Driver **£15**
- Citizen 120D Ribbons **£3.50**

Laser Printers

All Laser Printers (excluding HP Laserjets) include 12 months On-site maintenance

- Brother HL4-VE 4ppm **£594**
 - Brother HL4-PS Postscript 4ppm **£974**
 - Brother HL-10V 10ppm **£1045**
 - Brother HL10PS 10ppm **£1329**
 - Brother HL10DV 10ppm **£1149**
 - Brother HL10DPS 10ppm **£1445**
 - Canon LBP4 LITE 4ppm **£492**
 - Canon LBP4+ 1.5M RAM 4ppm **£644**
 - Canon LBP-8III Plus 8ppm **£945**
 - Canon LBP-8 plus IIIR 8ppm **£1435**
 - Canon LBP-8 IV 600 DPI 8ppm **£989**
 - Epson EPL4300 6ppm **£475**
 - Epson EPL5200 - NEW - 6ppm **£565**
 - Epson EPL7500 6ppm **£1139**
 - Epson EPL8100 10ppm **£920**
 - Fujitsu VM600 5ppm **£579**
 - Fujitsu VM800 (Best Buy) 8ppm **£535**
 - HP Laserjet IIIP 4ppm **£639**
 - HP Laserjet IIISi PS 16ppm **£POA**
 - HP Laserjet 4L - NEW 4ppm **£515**
 - HP Laserjet IV (600 dpi) 8ppm **£1075**
 - HP Laserjet 4M PS 8ppm **£1425**
 - HP Laserjet 4Si MX 1200 DPI 16ppm **£2329**
 - NEC Silentwriter S62P P/script 6ppm **£994**
 - NEC Silentwriter 266 8ppm **£669**
 - NEC Silentwriter 290P P/script 8ppm **£1469**
 - NEC Silentwriter S102 8ppm **£995**
 - OKI OL400E 4ppm **£449**
 - Panasonic KX-P4410 5ppm* **£462**
 - Panasonic KX-P4430 Satin Print* 5ppm* **£594**
 - Panasonic KX-P4451 11ppm* **£919**
 - Panasonic KX-P4455 Postscript 11ppm* **£1249**
 - Star LP-4 Postscript - **£774**
 - Star LP-8 III 2 8ppm **£1249**
 - Star LP-8 III 8ppm **£899**
 - Star LP-8 Star (post)script 8ppm **£1130**
 - Star LS-5 5ppm **£489**
 - Star LS-5 EX (RISC Based) 5ppm **£599**
 - Star LS-5 TT True Type + Mac 5ppm **£775**
- * Now with 2 years On-site warranty
- HP Laserjet IIIP 3 years on-site **£150**
 - HP Laserjet IIISi 3 years on-site **£450**
 - HP Laserjet 4/4M 3 years on-site **£170**

Laser Toners

- Canon 2, 3 & 4 **£52**
- Epson GQ **£13**
- EPL4/41/4300 **£55**
- EPL7100/7500/8100 **£117**
- KX-P4420/50/55 **£20**
- KX-P4410/30 **£29**
- Qume Crystal (3) **£75**
- HP IIP & IIIP **£54**
- HP II/D, III/D **£60**
- HP 4 & 4M **£72**
- OKI OL400/800 **£48**
- VM800 8K pages **£99**
- NEC SWriter **£84**
- Star LP4 **£52**
- Star LP8/Canon 8 **£59**
- Star LS 5 **£69**

Laser RAM Upgrades

- | Type | 1M | 2M | 4M |
|-----------|-----|-----|------|
| IIP; IIIP | £49 | £80 | £132 |
| II & IID | £60 | £96 | £142 |
| LJ4/4M | £- | £75 | £175 |
- 8M/£279
- EPL4100 £- **£120** -
- 512K/£52
- Canon LB8 **£139** **£275** -
- KX4420/50i **£59** **£89** **£149**
- NEC S62/S102 **£99** **£180** -
- Star LPB **£139** **£275** -

Laser Drum & Developer

- Epson Drum GQ5000 **£93**
- EPL7100 **£129**
- Panasonic 4420 Drum **£60**
- Developer **£80**
- Panasonic 4450 Drum **£93**

Jetpage Postscript Cartridge

- HP IIP/IIIP **£225**
- HP IID & IIID **£227**

Various Add-Ons

- HP Adobe costscript + Cartridge **£359**
- HP Premier Font Collection **£28**
- Laserjet various Font cartridges from **£45**
- Canon LBP-4 Lower Cassette Tray **£96**
- HPIIP/IIIP Lower Cassette Tray **£96**
- HP Postscript Module for LJ4 **£270**
- Laserjet 4 Powered envelope feeder **£199**
- Ethernet Card for Laserjet 4 **£359**
- LP4 500 Sheet paper cassette 3rd Bin **£205**

Fujitsu Printers

- B-100 InkJet - HP Deskjet compatible 300dpi, whisper-quiet & 6 resident fonts **#£159**
- B-200 InkJet - HP Desk Jet compatible 300dpi. Built in Cut Sheet Feeder. Optional 2nd Bin/Tractor available **#£239**
- DL-1150 Dot Matrix - 24 pin, 110 column Colour optional **£209**
- DL-1150colour Dot Matrix - 24 pin, 110 column With colour option **£235**
- DL1250 **£344**
- DL4600 **£799**
- DL5800 **£999**
- DL3600 **£439**
- DL1250colour **£344**
- Joywriter **£249**
- B-100 Cut Sheet Feeder **£65**
- B-200 2nd Bin Sheet Feeder **£95**
- B-200 Tractor Unit **£65**
- B-100/200 Ink Cartridges **£14**
- DL-1100 Colour Upgrade **£39**
- DL-1100 Ribbons Black **£5** Colour **£11**
- VM 800 Toner Cartridge (8000 pgs) **£105**

Hewlett-Packard Printers

| | |
|---|------------|
| DeskJet 500 | £255 |
| DJ550 colour | £459 |
| QuietJet plus | £399 |
| DJ Portable | £283 |
| DJ500 colour | £355 |
| Desk Jet 510 | £265 |
| Desk Jet 1200C | £1085 |
| Paint Jet | £495 |
| PaintJet XL300 | £1779 |
| 3 years on-site maintenance available as follows: | |
| DeskJet & DeskWriter mono | £55 |
| DeskJet & DeskWriter colour | £65 |
| • Paintjet Cartridges | Black £15 |
| | Colour £23 |
| • DJ Portable CSF | £49 |
| Carrying Case | £49 |

Desk Jet 500 Accessories

| | |
|--|-----|
| • 256K RAM Cartridge | £69 |
| • Epson FX Emulation Cart. (500 mono); | £45 |
| • Ink Cartridges Black £14; Colour £23 | |
| • High Capacity Black Ink Cartridge | £21 |
| • Black Ink refill Double Pack | £9 |
| • DJ500 Colour Archimedes Printer Driver | £15 |
| • Dust Cover | £6 |
| • DJ500C/550C Archi Printer Driver | £15 |
| • 636G 50 x Transparencies A4 | £40 |
| • 636J 50 x Glossy Paper A4 (also XL) | £40 |
| • 630Z 50 x Cut Sheet Paper A4 | £15 |

HP Paintjet/XL Accessories

| | |
|-----------------------------------|-----|
| • 630P 200 Z-Fold paper 8.5 x 11 | £14 |
| • 630Q 50 Transparencies 8.5 x 11 | £39 |
| • 630S 50 Transparencies A4 | £40 |
| • 630Y 200 Cut Sheets 8.5 x 11 | £14 |
| • 631Y 200 Cut Sheets A4 | £18 |

Plug In Font Cartridges for DJ 500

| | |
|---|--------|
| • 22706B - Prestige, Elite, Line Draw fonts | £55 |
| • 22706C Letter Gothic & HP Line Draw fonts | £56 |
| • 22707P - Proprint Emulation Cartridge | £57 |
| • Desk Jet Unlimited (Book No VAT) | £19.75 |

Canon Bubblejet Printers

| Printer | CSF | 2nd Bin | Ink Cart |
|---------------------------------------|-------|---------|----------|
| BJ10EX | £162 | £43 | £16 |
| BJ10SX | £175 | £43 | £16 |
| BJ200 | £274 | — | £16 |
| BJ300* | £335 | £88 | £12 |
| BJ330* | £373 | £110 | £12 |
| BJC800C | £1345 | — | £16 |
| * Includes 12 months On-site warranty | | | |
| • Spare Battery pack for BJ10E | £33 | | |
| • BJ10EX & BJ20 Turbo Driver | £42 | | |
| • BJC800 Archi Turbo Driver | £89 | | |

Roland Plotters

| | |
|----------------------------------|-------|
| • DXY1100 | £499 |
| • DXY1200 | £649 |
| • DXY1300 | £869 |
| • Sketchmate A4 | £308 |
| • Sketchmate A3 | £475 |
| • HP7440 | £665 |
| • HP7475 | £899 |
| • HP7570 | £2015 |
| • HP7575 | £2529 |
| • Roland plotter Pens, Fibre tip | £7.50 |

Epson Printers

| Printer | CSF | Ribbon |
|------------|------|--------|
| EX1000C | £428 | £— |
| FX870 | £273 | £47 |
| FX1170 | £339 | £69 |
| LQ100 | £148 | £— |
| LQ570+ | £205 | £47 |
| LQ870 | £359 | £47 |
| LQ1060 | £585 | £155 |
| LQ1070 | £310 | £69 |
| LQ1170 | £434 | £69 |
| LQ2550 | £673 | £360 |
| LX100 | £116 | £— |
| LX400 | £94 | £69 |
| LX850+ | £135 | £69 |
| LX1050 | £203 | £125 |
| SQ870 | £409 | £59 |
| SQ1170 | £560 | £155 |
| SQ2550 | £669 | £— |
| Stylus 800 | £244 | £— |

| | |
|--------------------------|-----|
| RS232 Interface Standard | £28 |
| +8K Buffer | £75 |
| Tractor Feed for: | |

| | |
|-----------------|-----|
| LQ100 | £29 |
| FX850/LQ800/850 | £69 |
| FX/LQ1050 | £85 |
| LQ2500/2550 | £90 |

• Dustcovers for Epson 80 col printers £6

Accessories

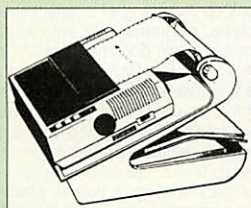
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|-------------------------------------|-----|
| • EX800/1000 Colour Option | £45 |
| • EX800/1000 Colour Ribbon | £14 |
| • Multifont Card for LQ550/850/1050 | £95 |

Listing Paper (Perforated)

| | |
|--|-------|
| • 1,000 Sheets 9.5" x 11" Fanfold Paper | £7 |
| • 2,000 Sheets 9.5" x 11" Fanfold Paper | £11 |
| • 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold | £21 |
| • 1,000 Sheets 15" x 11" Fanfold Paper | £9 |
| • 2,000 Sheets 15" x 11" Fanfold Paper | £16 |
| • 1,000 Sheets true A4 Fanfold Paper 70gms | £11 |
| • 2,000 Sheets true A4 Fanfold Paper 70gms | £21 |
| • 500 Sheets A4 80gms Bond | £3.50 |

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £19
132 Column version £29

Printer Labels

(On continuous fanfold backing sheet)

| | |
|-----------------------------------|-------|
| 1,000 off, 90 x 36mm (Single Row) | £6.00 |
| 1,000 off, 90 x 36mm (Twin Row) | £6.25 |
| 1,000 off, 90 x 49mm (Twin Row) | £7.50 |
| 1,000 off, 102 x 36mm (Twin Row) | £6.75 |

Laser Printer Labels on A4 Sheets

| | |
|-----------------------------------|--------|
| 3750 off, 70 x 29mm (3 Rows x 10) | £15.50 |
| 2400 off, 70 x 37mm (3 Rows x 8) | £15.25 |

Printer Ribbons & Various Dust Covers

| Type | Ribbons | Dust Covers |
|-----------------------|---------|-------------|
| BBC B/BBC Master | — | £4.00 |
| Archimedes Micro pair | — | £9.00 |
| Citizen 120D | £3.25 | £5.00 |
| EX800/1000 | £6.00 | £6.00 |
| RX/FX80/85/800/MX80 | £2.95 | — |
| FX/MX/RX100/1000 | £3.95 | — |
| Kaga/Taxan KP810/815 | £3.25 | £5.00 |
| LQ400/500/550/800/850 | £5.50 | £6.00 |
| LQ1050/LQ2500 | £12.00 | £6.00 |
| LX400/800/850 | £3.50 | £6.00 |
| M1009/GLP | £2.95 | £6.00 |
| NEC P2200 | £4.50 | £6.00 |

Dust covers for most 80 column printers available at £6 each

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

| Connects | Serial | Parallel |
|----------|--------|----------|
| • 2 to 1 | £10 | £10 |
| • 3 to 1 | £14 | £15 |
| • 4 to 1 | £19 | £20 |

Professional Type

| Connects | Serial | Parallel |
|----------|--------|----------|
| • 2 to 1 | £15 | £16 |
| • 3 to 1 | £20 | £23 |
| • 4 to 1 | £30 | £34 |

Cables from £5 each (see cable section)

Cross Over Manual Switch

| | |
|---------------------|-----|
| 2 In/2 Out Parallel | £29 |
| 2 In/2 Out Serial | £28 |
| 3 In/2 Out Serial | £36 |

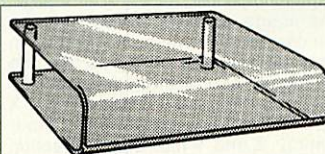
Auto Printer Sharer

| Connects | Serial | Parallel |
|----------|--------|----------|
| 2 to 1 | £34 | £36 |
| 4 to 1 | £52 | £53 |
| 8 to 1 | — | £85 |

Compact Converter Units

| | |
|--------------------|-----|
| Serial to Parallel | £32 |
| Parallel to Serial | £32 |

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

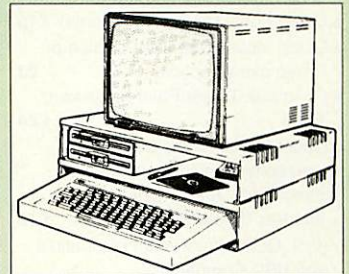
| | |
|--------------------|-----------|
| 80 Column version | £16 |
| | (carr £3) |
| 136 Column version | £20 |
| | (carr £4) |

256k Multi Spooler

These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

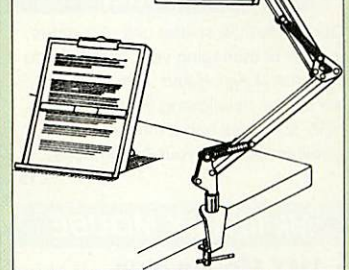
- 2 In/2 out £125
- 4 In/2 out £139
- 8 In/1 out £185

Plinths for the BBC Master and A3000



- Single Master Plinth 490 x 310 x 105mm £14
- Double Master Plinth 490 x 310 x 210mm £26
- A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive £15

Copy Holder



Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip.

Desk Top £8
Angle poise £12

NEW Copy holders as above but with a battery operated, remote controlled cursor/ruler. (By hand or foot pedal.) (Batteries 2 x AA not included.)

Desk Top £15
Angle poise £20

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Continued → → → → →



- Quest Mouse III & Quest Paint £49
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £69
- Quest Mouse III only £25
- Quest Paint Software only £28
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Conquest (Quest Paint Extension) ROM £24
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18 (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Mk III AMX MOUSE

- **AMX Mouse plus Super Art** £49 (Please specify for BBC, Master or Compact)
- AMX MOUSE ONLY £25
- AMX SUPERART Package £24
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £20
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £29
- AMX EXTRA EXTRA £16
- MOUSE MAT £3

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Archi Cordless Mouse



Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 minutes inactive
- Auto Power Shut-Down after 20 minutes inactive

Price £32

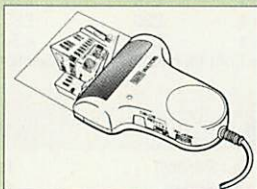
Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



- QT-10 BBC/Master Version £25
- QT-20 Archimedes Version £26

Beeb Hand Scanner



Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

Beeb HandScan & Firmware £99

Archi Mk II Hand Scanner

Watford's Mk II hand scanner has a maximum resolution of 400 dpi. The scanning width is 4". The sophisticated software is supplied in a 64K ROM, located on a standard single width expansion podule. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. Other facilities include Cropping and scaling to any size including stretching and squashing in X and Y directions separately. Colour tinting. X and Y flip. Edge detection which turns solid objects into outlines. Images can be printed on any printer supported by RISC OS. On-screen help is provided via the RiscOS interactive help facility. (Please write in for full technical details).

- AHS-4 Archi 300/400 Version £109
- AHS-3 Archi A3000 Version £119

Award winning Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

- Wapping Editor Software Pack £49
- Wapping Editor plus Mouse £69

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out. £15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor. Also included are two Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines. Supplied complete with instructions. £12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). £13

Archi A4 Scanner



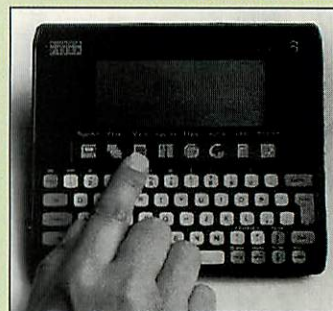
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures. Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity. Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

- Archi A4 Scanner £239
- Sheet Feeder for above £75
- Scanner + Sheet Feeder £309

Z88 Portable Micro

- Z88 Portable Micro £POA
- 32K RAM Pack or 32K EPROM Pack £16
- 128K RAM Pack or 128K EPROM Pack £32
- 512K RAM Pack £86
- 256K Eprom Pack £55
- Z88 Eprom Eraser Unit £38
- Z88 Carrying Case £8
- AA Nicad Rechargeable Battery £1.50
- Battery Charger Compact & Fast £6
- Z88 Serial Printer Cable £8
- Z88 Parallel Printer Cable £18
- Z88 to BBC Link £8
- Z BASE £49
- Z88 to PC Link II £27
- Z88 to Macintosh £32
- Z88 Mains Adaptor £9
- Z88 Modem £99

Psion Series III



- Psion Series III Computer
- Series 3 128K £155
- Series 3 256K £179

RAM Solid State Discs (SSD)

- 128K £68
- 512K £170
- 1Mb £255

Flash Solid State Disc (SSD)

- 128K £34
- 256K £59
- 512K £102
- 1Mb £170
- 2Mb £255

Communications

- Parallel Interface Link £25
- RS 232 Serial Link for PC £58
- RS 232 Serial Link for Mac £59

Various

- Mains Adaptor 9V AC £12
- Spreadsheet £59
- Professional Finance £42
- Spelling Checker/Thesaurus £42

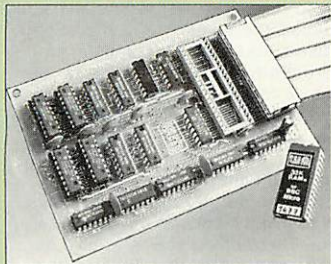
HP Palmtop PC

- HP95LX 512K Palmtop PC £199
- P.S. Above price includes Lotus 123, Desk Diary and Memo softwares in ROM
- HP Connectivity Pack £55
- HP95LX 512K RAM Upgrade £POA

Fax Machines

- Brother 305# £335
- Brother 450# £375
- Brother 550M# £455
- Canon 170 £520
- Pana UF121 £320
- Pana UF128M £415
- KX F2090BE £488
- Tosh TF132 £349

32K Shadow RAM/ Printer Buffer Card Expansion Board



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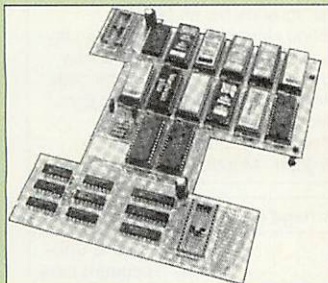
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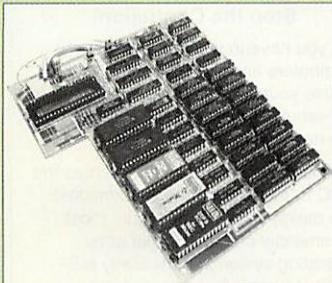
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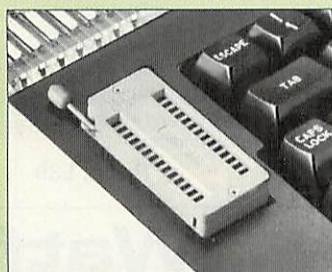
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| Mega-3 ROM | £76 |
| Spell Master | £42 |
| Wordwise Plus | £38# |
| # Price includes a FREE Wordaid Rom | |

Word-Aid

This advance utilities ROM extends the power of your Wordwise plus ROM.

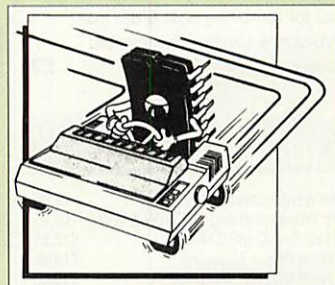
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(N.B. Word Aid requires a Disc interface in your Micro)

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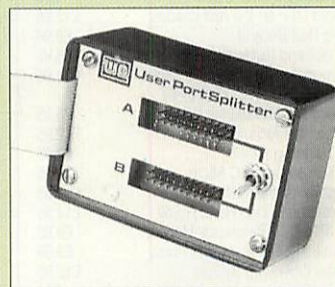
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'ACORN TO PC' enables you to change over painlessly. It shows clearly and quickly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you.

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BEEBUG & RISC developments

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Beebug and RISC Developments are leaders in the Acorn Marketplace. As well as being one of Acorn's largest dealers we have exciting ongoing developments of both hardware and software for the Acorn range of computers. We also publish the acclaimed RISC User and BEEBUG magazines. We now have vacancies for three new staff.

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Salary circa £12,000

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We need someone who has a reasonably detailed technical knowledge of Acorn's 32 bit range (the Archimedes series) to provide technical support for RISC User magazine and for a range of other products. The right person can also expect to have a substantial involvement in contributing to and editing RISC User, depending on qualifications and experience.

The position requires a competent programmer with a knowledge of Basic and the Wimp, while experience with ARM assembler and/or C would be an added advantage. A good command of English is also required, and the ability to write about technical matters in a clear and readable way will be a positive advantage. The person appointed will be expected to deal with technical queries from readers by phone and by letter.

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legend had it
a shrine was built
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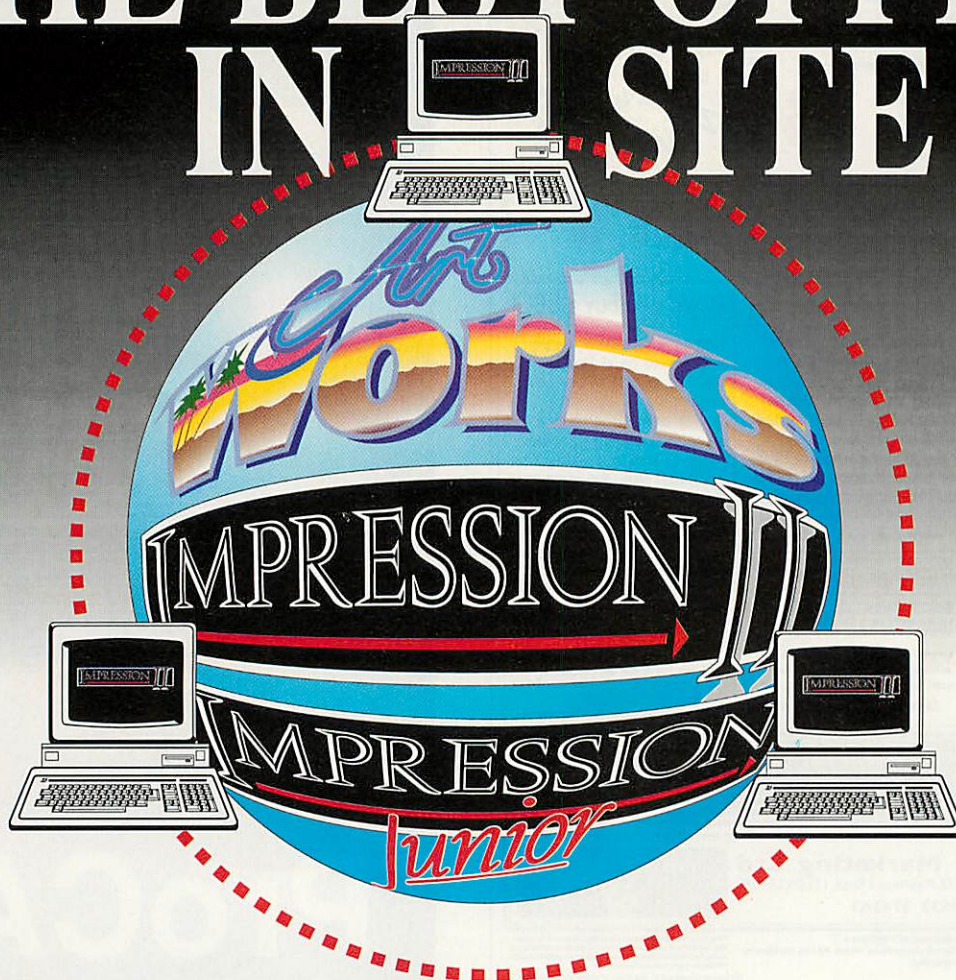
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AUN compatible and can run over Econet, Ethernet or Nexus.

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Think of it this way; if your site has 20 machines, an Impression II network licence works out at £33 per copy, when the RRP is £169. We're sure you'll agree that this pricing is attractive, which is why 3000+ sites have Computer Concepts licences !



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You know what your applications do, now Gavin Burns explains how they do it

ABSOLUTE BEGINNERS

It is very likely you have never wondered how an application works and the stuff of which it is made. But consider this. Without this vital addition to your knowledge, there is little chance you will ever reach Super User status. So let us take you on a tour of the inner life of your application.

As you already know, when you double-click on a directory, it is opened, allowing access to whatever it may store. If the same action is performed on an application icon, the program will actually run.

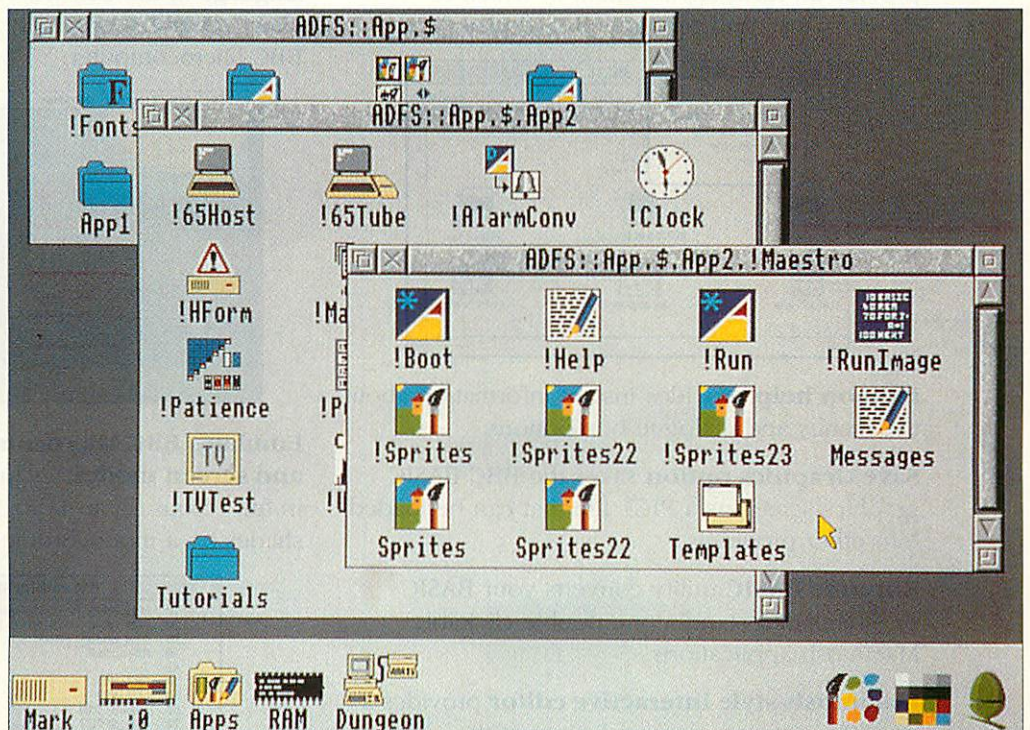
Nonetheless, an application is really a special kind of directory. It is treated differently to a normal directory and is indicated by being started with a ! character. This exclamation mark is known as a *pling* to technical people.

BEHIND THE ICON

To explain how an application works, take the example of *Maestro*. This application is included with Risc OS, and allows you to create your own symphonies. Its contents are typical of most applications. Hold down the SHIFT key and double-click on the *Maestro* icon. Several files appear. Some look like sailing yachts, others like *Edit* files.

The first is *!Boot*, an obey file. To see the commands it contains, load the file into *Edit*, by dragging the *!Boot* icon onto *Edit* on the iconbar at the bottom of the screen. An extremely important file this, as anyone who read last month's Absolute Beginners will know. *!Boot* files are basically bossy and set everything up. In the case of *Maestro*, it loads the application sprite into memory and sets up things like file types, so the computer knows what to do when you run a *Maestro* file.

If you get stuck and desperately require extra guidance



All the different files which go to make up Maestro

while using any application, *!Help* is at hand. This is a text-file containing instructions for the application. It's inefficient to access *!Help* each time by pressing SHIFT and double-clicking to request the file, so hold the menu button over the *!Maestro* application icon and a number of options will appear; one of these is *Help* but without the pling.

!Run is another important obey file. It is run whenever you double-click on the application icon, and it sets up the necessary amount of memory required for the application to run. It loads and checks relevant modules before actually running the main program.

The program itself is in *!RunImage*. *Maestro* is written in Basic, the easiest programming language. (The more advanced among you will know of other programming languages like C; other applications may be programmed in these, rather than Basic.)

The next three files are sprite files. *!Sprites*, *!Sprites22* and *!Sprites23* contain files which dictate how the application icon looks in a directory. Loaded by *!Boot*, each file is for a different mode.

!Sprites is for low-resolution monitors, *!Sprites22* for high-resolution mono screens and *!Sprites23* is suitable for high-resolution colour monitors. Your computer is configured to know what monitor it is attached to and will automatically load the appropriate sprite file.

If you decide to meddle with an application, to change it to run in French say, alter the text file *Messages*. Look at its contents by loading it into *Edit*. You can see that this file contains all the instructions and words that appear in the application. It's very easy to alter any of these lines: delete what you don't want and replace it with what you do. The application will read these mes-

sages and *Maestro* will appear in the language you have specified until you change it again. But make sure you have a working backup copy of your applications, before ad-libbing in the message file.

Another two sprite files follow, *Sprites* and *Sprites22*. All the pictures and musical notation that appear and are used in the *Maestro* windows are stored here - crochets, quavers, bass clef, treble clef and so on. To see the sprites, load them into *Paint*.

The size and shape of windows is defined in the templates file. If you have *FormEd*, a template editor which comes with both Acorn's C and Assembly compilers, edit the windows to your own tastes. If not, you'll just have to put up with them as they are.

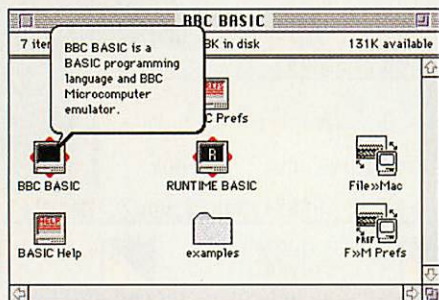
This theory works for other applications as well, but they are all slightly different. Why not try out a few of your own?

BBC BASIC Version 3

Programming language and Emulator for the Apple™ Macintosh™

Combines the power of the Macintosh ...

BBC BASIC 3 takes advantage of the advanced features of the Macintosh, and System 7, to provide an ideal environment in which to develop, test, and run your BASIC programs.

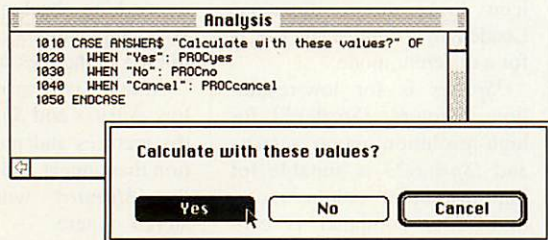


Balloon help provides instant information about the menus and dialogue-box options.

Save Graphics option saves the BBC BASIC graphics screen as a PICT file that can be loaded into other programs.

Runtime BASIC utility converts your BASIC programs into stand-alone double-clickable Macintosh applications.

Macintosh-style interactive editor provides a scrolling view of program listings with convenient cursor or mouse editing. You can work with any font available on your system and you can display keywords highlighted in bold for easy reference.



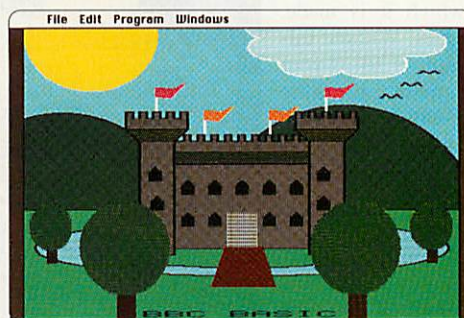
Macintosh Toolbox interface allows you to define your own menus, dialogue boxes, and scrolling lists using convenient BASIC keywords, and use the standard file dialogues for opening and saving data files.

Dynamic tracing and debugging lets you run or step through a program, highlighting each statement as it is executed, and you can display the values of any variables or expressions.

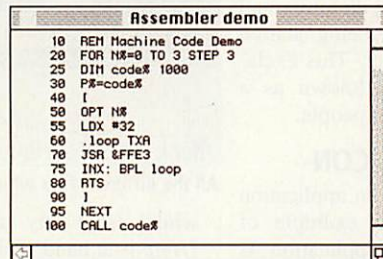
Comprehensive help system gives you instant information on keywords and operators, without interrupting what you are doing.

...with the best of the BBC Microcomputer:

BBC BASIC for the Macintosh gives you access to the foremost educational programming language in the UK, with the ability to run many programs originally developed for the BBC Microcomputer.



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Built-in assembler and 6502 machine-code interpreter allows you to compile and run 6502 assembler programs, or machine code which you have loaded in directly.

Full emulation of the BBC Microcomputer Operating System including all the standard system calls and vectors, OSBYTE, OSWORD, *FX calls, VDU codes, function keys, sound, and DFS/ADFS commands.

Includes File>Mac transfer utility to transfer programs and data files to or from an Acorn Archimedes or BBC Microcomputer.

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(no stamp required if posted in UK)

Telephone: (0223) 314934. Fax: (0223) 462562

BACK TO NATURE

Scenes and sounds from nature provide a perfect subject for CD-Rom.

Clare Johnson looks at three classroom choices

There are a number of CD-Roms appearing on the market claiming to fulfill tricky areas of the National Curriculum. This month we take a look at three packages. These tackle the areas of plants, animals and birds, respectively.

CREEPY CRAWLIES

Supplier: Media Design Interactive

Tel: (0252) 714340

Price: £99

The *Creepy Crawlies* CD-Rom contains numerous creatures under headings such as Wet Stuff, Killers and Strange Habits. These names and others appear as the front menu and, apart from an alphabetically-arranged index, this appears to be the only way to search the database.

Each card has a still photo, a video sequence and the text. This text can be preset into English or French and harder or easier language content can be selected. Each card also has a spoken narrative describing the creepy crawlly, but this doesn't match the written text so it can't be used to encourage reading.

The card also contains the family tree of each creepy crawlly, giving full biological classification of the animal. I would like to be able to search more fully but its contents are fascinating and the video sequences are very good.

BRITISH BIRDS

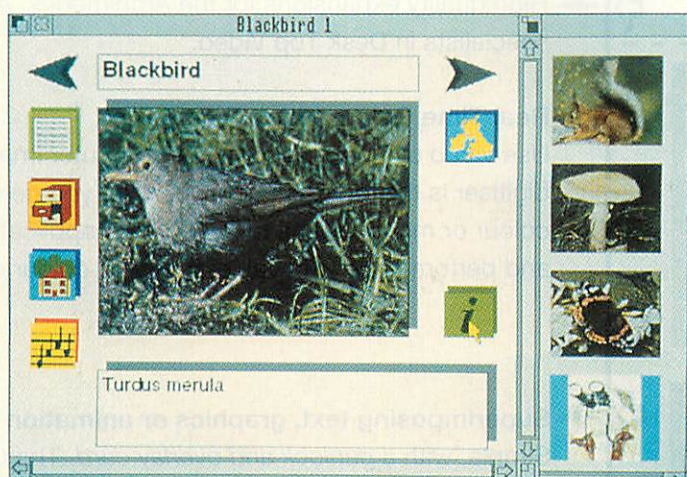
Supplier: Interactive Learning Productions

Tel: 091-261 1255

Price: £125

This CD-Rom, produced in conjunction with the RSPB and the British Library, includes all-year-round residents, winter and summer visitors and occasional callers.

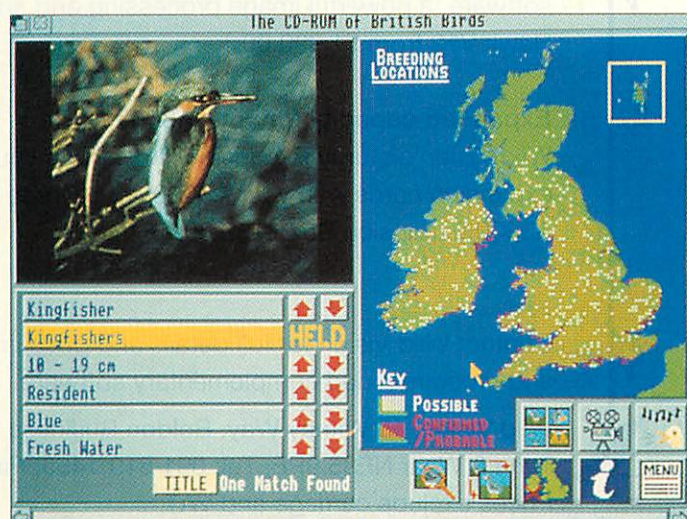
The nicest touch is the tutorial on disc, which shows how to put together a complex search. Each bird is classified



Woodlands offers a comprehensive approach



Creepy Crawlies looks at Wet Stuff and Killers



British Birds gives a comprehensive guide to habitat and other details

by name, group, length, habitat, colour and residency. There is a map for each bird's breeding area, extensive text, sound recordings of calls, and song and video clips.

The photos can be viewed in close-up, giving young users the chance to look at feet and beaks in real detail. The text also contains certain keywords written in red and hyperlinked to other cards, giving explanations of their meanings and other details.

There is also a quiz, accessible at any point from the database so pupils can test themselves on what they have learnt.

WOODLAND

Supplier: APA Multimedia

Tel: (0634) 295222

Price: £150

The contents of this CD-Rom are not difficult to predict. A large number of animals, birds, butterflies, creepy crawlies, plants, flowers and fungi are catalogued alongside sounds, facts, figures, and habitats.

The information is easy to read, but beware opening too many windows: you soon run out of memory. The sound recordings were excellent.

The database has 'supersearch', allowing users to combine up to three criteria in one search, giving a list of results for you to choose from.

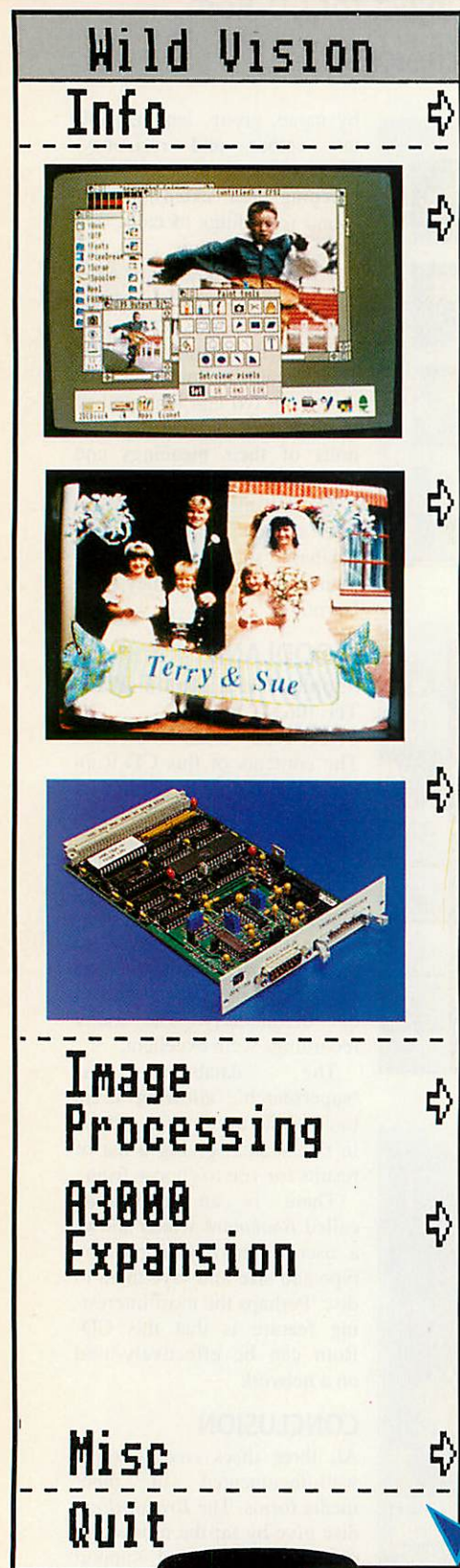
There is an application called *Bookmark* which allows a user to mark resources by type and size and save them to disc. Perhaps the most interesting feature is that this CD-Rom can be effectively-used on a network.

CONCLUSION

All three discs cover ground well-documented in other media forms. The *British Birds* disc give by far the most comprehensive data and support material but all three would have value in areas of Science and Environmental Studies.

DESKTOP VIDEO

ON THE MENU TODAY...



High quality expansions for the Archimedes, A5000 and A3000 from the specialists in Desk Top Video.

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Use video or TV as a source for computer images. The popular Hawk V9 digitiser is the ideal solution wherever you need photograph-like sprites in colour or monochrome for DTP or Art applications. Wild Vision combine quality and performance with value; real-time colour digitisers available from £199.00.

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Wild Vision's sturdy Expansion Box allows you to use standard Archimedes expansion cards with your A3000; up to three cards may be fitted at once. A3000 Expansion Box £139.00.

Contact Wild Vision for full details and price information on the above hardware and recommended complementary software.

Wild Vision, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne & Wear NE35 9PE, Tel: 091 519 1455, Fax: 091 519 1929

Prices exclude carriage and VAT



WILD VISION

The user guide for Knowledge Organiser points out that humanity's well of knowledge, most of which exists in text form, now doubles in volume every five years. Clares' Knowledge Organiser 2 is designed to tackle this problem in a flexible and context-sensitive manner.

Clares first brought this unusual, free-form, textual database system to the Archimedes market five years ago. Unfortunately, KO mark I was only for the dedicated few. It wasn't Risc OS-compliant and its user interface was tricky to master. Clares has addressed these criticisms and has employed Icelandic programmer Höskuldur Hermannsson to remould the original, quirky KO into a genuine, full-blooded Risc OS application.

KO2 is a complete rewrite. The package labels and indexes chunks of text, so stored information can be searched using codewords or mnemonics relating to specific topics. Original KO files can be translated into KO2 format.

Everything revolves around Subject files. These contain the text data to be searched plus search codes and an index. Each text item has a collection of context and source codes associated with it. Context codes are created by the user in mnemonic form. If your Subject file contains several items relating to desktop publishing the context code could be DTP. If it relates to Clares Micro Supplies products you might use CMS. Generally, context codes are kept to five characters or less.

A full list of context codes relating to passages in each Subject file can be displayed. There is also space for a short definition of each code, and both the code mnemonic and definition can be keyword-searched. This is important because a complex Subject file could have dozens, even hundreds of context codes. The same list can show any hierarchical relationship with other context codes: koalas within marsupials within mammals, for example.

There is also a list of source codes which can be updated to indicate where a particular text passage was obtained, who the author was, and so on. So, if I had written the piece, the code could be IFB, including my middle initial. Like context codes, source codes can be searched. So, I could look back on all the articles I had written on desktop publishing, using the DTP context code, then the IFB source code.

Central to KO's operation is the Linker. Each text passage in a Subject file has a Linker card, which always features context and source code data. More fields can be added and defined by the user. It's through the Linker window that complex searches involving a selection of codes can be set up.

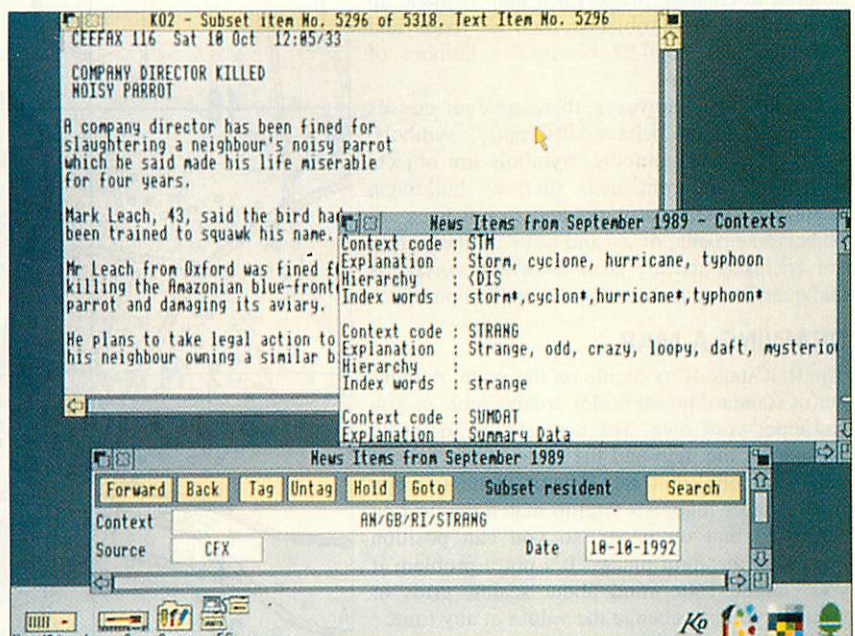
Although this type of database does not require strictly-defined templates, a fair amount of work is involved in planning and creating a Subject file.

You need to evaluate the incoming data, invent meaningful mnemonics for the codes and ensure they all have precise descriptions. This may sound simple, but the actual process is quite complex. Text passages can be sourced from almost anywhere, from word processor documents to CD-Roms – even videotext or teletext frames. It's especially suitable for the latter, as

GET YOURSELF ORGANISED

Inputting data is easy, recovering it is another matter. Ian Burley looks at one answer:

Clares' Knowledge Organiser 2



A steep learning curve is rewarded with a great deal of search power

news items, for example, come in neat, bite-sized chunks.

KO2's potential is clearly displayed by a sample Subject file which covers a wide range of humorous quotations. However, at first I felt quite intimidated by the strange collection of alien search codes and the relationships between them. KO2 is much more logically presented than its predecessor but is still far from simple. Setting up your own Subject files is a labour of love; getting used to files generated by others means scaling a steep learning curve.

I am used to direct, keyword text-searching utilities, common in the PC market. The process is automatic, though depending on the algorithm, lengthy. KO2 highlights the lack of a simpler, keyword-based, file indexing application for the Arc, like WordBase on the PC.

This is an elegant package, but I can't help feeling it is a niche one. That said, I am pleased that Clares has persevered with KO2 since a well-built KO2 database gives the user a great deal of search power. Now, I wonder if its capabilities could be extended beyond plain text: a multimedia version perhaps?

Computers are well-suited to map-making. Maps in computer format can easily be updated, printed, scaled and analysed, unlike their paper counterparts.

It comes as no surprise, then, that Clares has released *Topographer*, a combined two- and three-dimensional mapping package. Aimed mainly at the educational market, the package allows you to create a two-dimensional map, then to generate three-dimensional views, as if you were actually there.

TWO-DIMENSIONAL MAPPING

Topographer consists of two applications: *Topo2D* and *Topo3D*. Maps are created in *Topo2D*, and can be exported to *Topo3D* for rendering. Although the aim of the package is to create 3D scenes from maps, you'll find most of your time is spent drawing maps in *Topo2D*.

Conceptually, *Topo2D* is a bit like *Draw*, but tailored to creating maps. Each map is made up of a collection of objects, such as roads and contours, and *Topo2D* borrows a number of features from *Draw*.

Unlike *Draw*, however, there are four classes of object which behave differently: symbols, lines, areas and contours. Symbols are objects which are self-contained, such as buildings, telephone kiosks, car parks and so on; lines are objects like roads, rivers and railway lines; areas are enclosed spaces, such as woods, orchards and quarries; and, contours are, well, contours.

DRAWING A MAP

The first stage is to decide on the scale. A number of standard preset scales are available or you can enter your own. The next step is to set up the size of the map and the scale of the grid (if you want one, that is); if you intend to copy from a paper map, it's vital to match the grid on screen to that on paper, so you can position objects at the right places. It's not a problem if you change your mind about scales, grids or sizes, as you can change the values at any time.

Now comes the hard bit: drawing the map. The main tools used are the Features window, which contains icons for all the objects available, and the Co-ordinates window, which continuously shows the pointer's map reference.

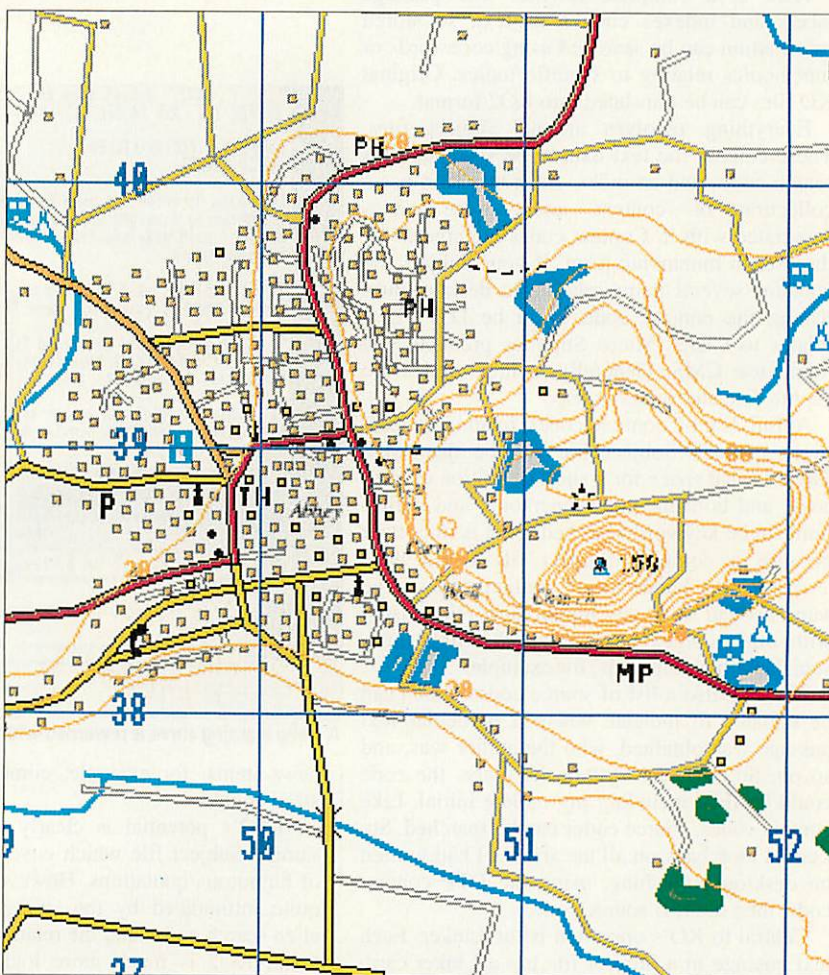
Placing objects is easy. Choose the object – be it a road, post office, contour or whatever – in the Features window, then click in the Map window. The name of the symbol is shown at the bottom of the Features window: invaluable if you have a tendency to get your public houses and your post offices mixed up. There may also be a parameter which can be altered, such as the height of a building or value for a contour.

Symbols are placed straight on the map; roads are created as sequences of points joined up by straight lines; areas and contours are closed paths (so the start and end points are the same). Lines are created in a similar way to *Draw*: you click at the start, move the mouse to the next point and click, then the next point, and so on.

The last point to be entered can be removed by clicking Adjust, and holding down Adjust lets you backtrack along the line rapidly. Double-clicking finishes the path. The object is then displayed (red for major roads, yellow for minor roads, blue for rivers and so on).

PLOT ON THE LANDSCAPE

Mark Moxon charts a course through *Topographer*, the new package from Clares that adds an extra dimension to map-making



Glastonbury town as seen by *Topographer*

This method is fine if you want very straight roads and rivers, but if you want accurate curves, it's tricky; this is where the freehand feature comes in. By holding down Select, you can move the mouse around, and a path will be created, consisting of lots of little straight lines.

For those of you with *ArtWorks*, this is similar to the freehand option in that application, except only straight line segments are created, not Bezier curves. There are also a couple of nice features which let objects fit together neatly on the map: when a road needs to go over a bridge for example. You can see this in action on the yellow road going south out of Glastonbury.

Another feature which makes maps neater is

the ability to join roads seamlessly. If, for example, you are drawing a minor road which you want to join to a major road, holding down CTRL when clicking the last point of the minor road will create a neat junction.

CHOPPING AND CHANGING

As you would expect, objects can be selected, copied, cut and moved to the front or back. The copying system uses a clipboard rather than Draw's straight copying. This is an improvement, *Topographer's* technique being more useful for editing multiple selections.

A very useful addition to the editing features is the ability to change object parameters for selected objects; you can, for example, select all the churches in your map and double their height. An interesting point is that you can alter the sizes of buildings, but their icons on the map remain a fixed size.

One annoying situation occurs when selecting objects. If you have a contour, for example, then clicking anywhere on the contour line will select it. This can cause havoc if you have a house positioned on a contour, as you can spend ages clicking over the house, only to find that the contour is selected every time.

The solution is to change the Selection Focus. This lets you decide which types of object are selected: symbols, lines, areas, contours or any combination. It also allows you to delete all objects except contours, for example, to show the shape of the landscape, or you can switch off all selection so you can't accidentally move what you have drawn.

Another feature of the Select submenu is contour replication. Drawing contours accurately is a real pain, and replication allows you to generate contours based on one example shape. This contour is automatically copied and reduced, and a user-determined value is added to (or subtracted from) the height. If you look closely at Glastonbury Tor in our example (to the south-east of the town) you see that the contours are all the same shape; I cheated a little and used replication to create the Tor.

There are a number of other features which you would expect to find. Your map can be zoomed to a percentage of its normal size; it can be saved either as a map file or as a Draw file (though you can't load Draw files back into *Topo2D*); and you can print your map via the normal printer drivers. The final option on the *Topo2D* menu is Export to 3D.

RENDERING MAPS

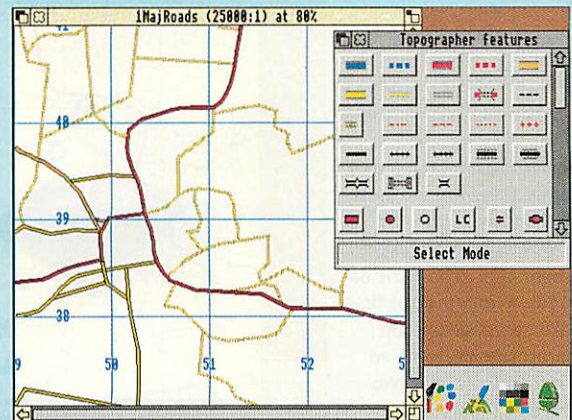
Topo3D is very simple to use. Loading a map file into the application displays the map in a window (which can be zoomed if required) and in this window you define the view to be rendered. A view is constructed from an arrow and a cone: the arrow determines the position and direction of your gaze, and the cone defines which area of the map should be taken into consideration – everything outside the cone is ignored. You set the viewer's height above the ground, and the line of sight, so you can obtain views taken from above the ground (as in the example scene).

Views can be stored and recalled, and are saved along with map files. Rendering views

MAPPING GLASTONBURY

MAIN ROADS

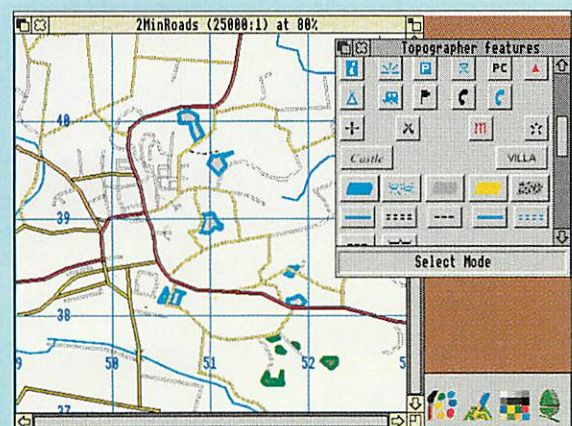
To test out the application, I created a map of Glastonbury, as that area contains a number of interesting features, such as Glastonbury Tor. To start off, I drew the main roads, as these were the most obvious objects on the OS map and would help me position other objects such as minor roads, rivers and woodland in later stages. Most of the roads were drawn freehand.



MINOR FEATURES

My next step was to add minor roads, paths, rivers, the bridge on the south-bound road, orchards and woodland. You can see that the map is beginning to look fuller and more realistic.

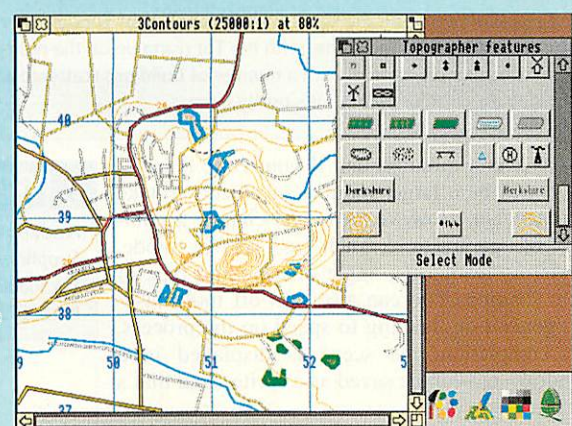
Note that some of the smaller orchards do look like lakes, and some of the white roads in the centre of the town look a little messy because they are transparent.



ADDING CONTOURS

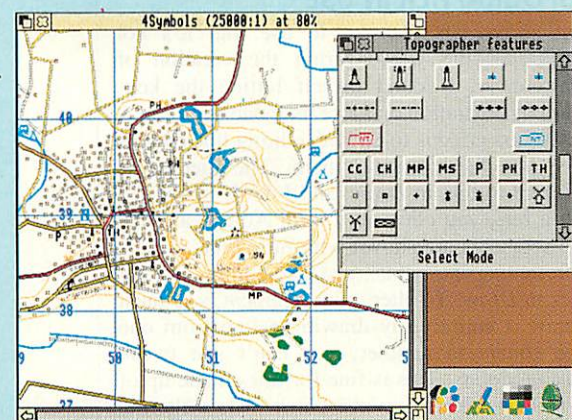
I added all the contours to the map in stage three, without a doubt, the trickiest part of the operation. I drew the large contours first, then used the replication option to create Glastonbury Tor.

The Adjust Parameters tool was invaluable for checking the heights of the contours. However not all of the heights are shown on the screen because there simply isn't room.



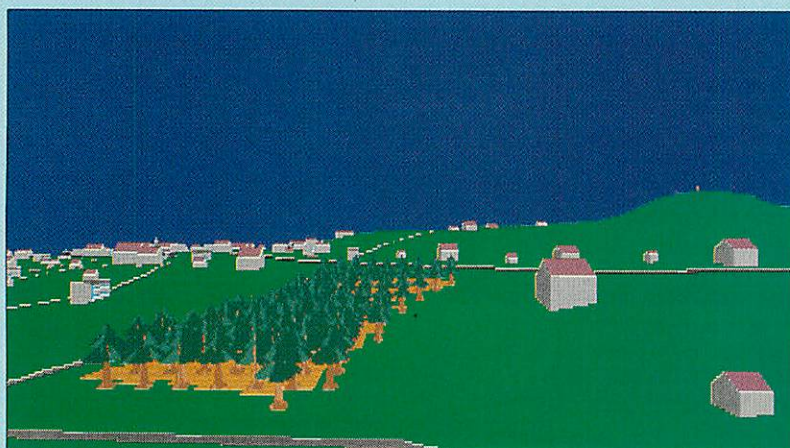
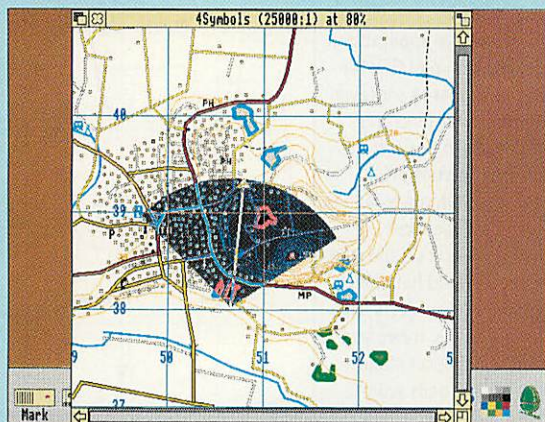
THE FINISHED MAP

The main addition is that of the buildings in Glastonbury, but other points to note are the spot height on top of the Tor; ancient lettering for the Abbey, Barn, Well and Church; various campsites, pubs, churches and a number of other symbols. That maps this complicated can be created with *Topo2D* is as good an indication of the capabilities of the software as any.



RENDERING A 3D SCENE

This is the view set up in *Topo3D*. The observer is standing south of the town and south-west of the Tor, and is looking in a northerly direction. The cone chosen for rendering includes the Tor and most of the town centre, with a large orchard right in the foreground. It is restricted in size to improve the time taken to render; in this particular case, using an Arm3 it took about two and a half minutes.



The result of rendering the view shows the power of *Topographer*. Glastonbury town lies on the left-hand side of the scene, with the Tor rising up on the right-hand side. There is the orchard in the foreground, with a number of buildings scattered around. Glastonbury may not look exactly like this, but it's pretty close.

takes several minutes, and if your cone is large, there will be a larger number of objects to take into account. However, you can change a number of parameters, such as screen mode, rendering resolution, angle of cone and type of light shading. You can also turn off multi-tasking generation, helping to speed up the process. On completion, the scene is displayed in a window, and can be saved as a sprite. And that's all there is to it.

TOPOGRAPHER IN USE

Topographer is pleasant to use, but it's not perfect all the way. During the creation of Glastonbury, I found myself hitting the keyboard in frustration on more than one occasion.

My first gripe is to do with editing line objects once you have entered them. The method is different to that in *Draw*, and I don't like it. To edit a line, you click on it with Adjust, and the line segments are shown with little blue squares representing the points, just like editing straight lines in *Draw*. To alter a line segment, you must redraw it entirely, by drawing a line from one blue square to another; you can't just tweak existing points. This is fine for lines made up of a small number of points, but it makes altering complicated lines, such as those produced free-hand, nearly impossible.

PRODUCT DETAILS

Product: *Topographer*
Supplier: Clares Micro Supplies
Tel: (0606) 485111
Price: £79.95

Also, if you make a mistake while editing a line and you choose to abandon the edit, the entire line is deleted, not returned to the state before the edit was started. I frequently found it easier simply to redraw lines than try to edit them, and that's surely counter-productive. The whole line-editing process seems very odd to me, though Clares assures me it is an unavoidable consequence of storing curves as straight lines. If *Draw* copes, why can't *Topographer*?

Another irritant is that you cannot get the co-ordinates of points you have entered, without placing the mouse pointer over the point and looking at the Co-ordinates window. It would be useful to be able to enter points by typing in their co-ordinates, rather than having to move the mouse to an exact position and click. Copying maps from paper requires accurate positioning of objects, and that's very hard just using the mouse and the Co-ordinates window.

There are further little niggles. Minor roads, normally shown white on OS maps, are drawn as transparent. This is correct, because it means if you put a minor road through a forest, it goes green, just like on OS maps. However, when minor roads meet, the junctions look a bit messy, as you can see if you look at the minor roads in Glastonbury town centre.

Orchards are, rather strangely, shown in grey with a cyan border, rather than green. I suppose this is to distinguish them from the three types of woodland (coniferous, non-coniferous and mixed) but it means if you have a small orchard, it comes out blue: indistinguishable from a lake.

Houses are also a bit of a problem. In this version, you enter each house as a separate box, as you can see from the map of Glastonbury. This doesn't look too bad on the map, and can give a better feel for the spread of a population centre than the OS convention of marking built-up areas. When it comes to rendering a 3D scene, however, the houses look a little lonely, not giving the feel of a town at all. For Glastonbury, I had to create a large number of houses in the centre, then view it from a distance at an oblique angle to get any feeling for a centre of population. Clares hopes version two will cope with built-up areas, but that remains to be seen.

The large number of objects I had to create for the town centre also meant that the window refresh was noticeably slow, even on the Arm3. As an experiment, I turned the Arm3 cache off, and it took a good ten seconds or so to redraw the entire map; that can really grate if you drag windows around in front of your map.

CONCLUSIONS

Despite my grumbles, I liked *Topographer*. As a tool for bringing mapping alive it is unrivalled, and there is immense satisfaction to be had from creating a map of a real area and being able to visualise it in three dimensions.

The software performs very well, and is easy and intuitive to use and it's wonderful to be able to create OS maps easily, and then incorporate them in DTP packages as *Draw* files. Little things, like showing the names of the symbols in the Features window, will be invaluable in helping children get to grips with map reading. It's not hard to see how this would add spice to geography lessons.

RISC Developments Software



Masterfile 3

DATABASE MANAGER

Masterfile version 3 is the latest development in the best selling family of database programs for Acorn systems. It is fast, simple to use and provides powerful data management facilities suitable for home, education and business use. Included amongst its many features is a very comprehensive indexing system allowing data to be accessed in any order. In addition, subsets may be created allowing access to just those records that match the search criteria. Both indices and subsets are updated automatically when records are added, modified or deleted. The report generator allows databases to be printed in card or spreadsheet form, and provides full label printing facilities. To trade-in an earlier version of Masterfile, please return your original disc to the address below, and deduct £5 inc VAT from the price. Only one trade-in allowed per order.

Price: £49
Site licence: £245



Hard Disc Companion

HARD DISC BACKUP

Version II of Hard Disc Companion offers superior performance and efficiency. It has been completely re-written and is now twice as fast and even easier to use. It provides a structured approach to the backing up of hard drives, and the recovery of files in the event of disc failure or accidental file deletion. Both Full and Incremental backups are supported, and the files to be backed up or ignored may be specified using simple drag operations. The entire backup specification may be saved in a script file for use at a later date. Hard Disc Companion II uses an efficient compression system to backup as much data as possible onto the floppies without increasing the backup time. Separate applications are included to restore entire backups or just selected files.

Price: £45
Site licence: £225



Hearsay

COMMUNICATIONS

Hearsay II is the most advanced communications package available for Acorn systems. It is multi-tasking and fully RISC OS compliant and is designed for easy communications for the first-time user, but with a wide range of advanced features making it the professionals choice. Hearsay is ideal for use with Prestel, Telecom Gold, Campus 2000 and Compuserve, and also provides very high quality VT320, VT102, VT52 and Tektronix 4105 Colour terminal emulations for direct connection to mini and mainframe hosts. In addition it gives access to Minitel systems such as the Teletel service and provides Xmodem, Ymodem, Zmodem and Kermit file transfer, a comprehensive script language, an auto-dial number directory and drivers for most popular modems. Please write of phone for detailed specification.

Price: £75
Site licence: £375



PlayBack

MOUSE RECORDER

PlayBack allows recording in real-time of all mouse and keyboard operations as they are carried out. This new package will produce intriguing and eye-catching displays that will be of interest to home, education and business users as well as for training. It is an ideal tool for creating demonstrations or testing programs which run in the desktop. During desktop operation, all mouse operations and key presses may be recorded and saved to file. On playback everything will happen in exactly the same way, with the pointer following all the recorded movements, and text appearing on the screen as if typed from the keyboard. A synchronised text commentary maybe added, and recordings may be converted to ASCII format for editing. A play-only version is supplied which may be freely distributed with recordings.

Price: £19
Site licence: £95

RISC
developments

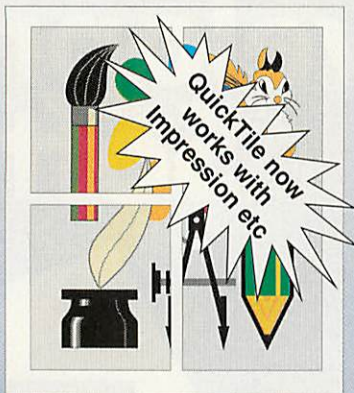
RISC Developments Ltd.

117 Hatfield Road, St. Albans, Herts. AL1 4JS Tel. (0727) 40303 Fax. (0727) 860263

All software is available from good dealers or direct from RISC Developments. Please add VAT to all prices and carriage of £3.00 for Hearsay and £2 for other software. Please write or phone for details of educational prices and site licences.

QuickTile

Up until now it has only been possible to print posters from Draw and Sprite files. Now with QuickTile you can create posters from ANY RISCOS application. The user simply enters the size of the source document, select the required poster size and then PRINT directly from the application! QuickTile does the rest, printing each tile with crop marks and tile references.



£25+VAT

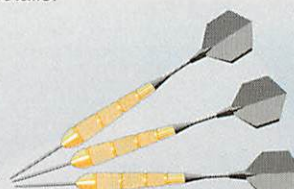
TopicArt

A new form of clip art comprising of single discs containing approximately 50 hand drawn high quality draw format clip art images, each on a single subject. Site and area licences are available, please ring for details.



TopicArt9 - Dinosaurs

£8
+ VAT
per disc



TopicArt7 - Sports Equipment

Subjects available
1 - General
2 - Transport
3 - Costumes
4 - Entertainment
5 - Bugs 2 Slugs
6 - Road Signs
7 - Sports Equip
8 - Sports Figures
9 - Dinosaurs
10 - Symbols
11 - Tools



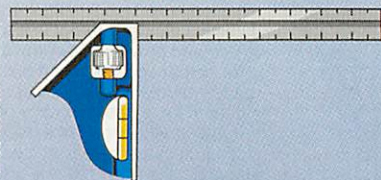
TopicArt4 - Entertainment

11 TopicArt subjects are available now. Please specify when ordering.

Buy 4
TopicArt
discs get
one free



TopicArt8 - Sports Figures



TopicArt11 - Tools

Finance 14.7% APR

| Product | Deposit | 24 mths | Total |
|-------------------|---------|---------|---------|
| A3010LC System | 79.00 | 34.50 | 907.00 |
| A4000HO Standard | 117.83 | 50.60 | 1332.23 |
| A4000HO MultiScan | 123.58 | 53.14 | 1398.94 |
| A5000LC System | 169.00 | 73.31 | 1928.44 |
| A4HD60 | 199.23 | 86.11 | 2265.97 |

The above finance is available to anybody over the age of 18, subject to status. Payment Protection is available on application. Special offers do not apply to purchases on finance.

Acorn Ext Warranty

| Product | Deposit | 24 mths | Total |
|-----------------------------------|---------|---------|-------|
| 1 Year On-Site Service | | | |
| A3010, A3020 or A4000 | | | £25 |
| A5000 | | | £34 |
| 3 Year Warranty & On-Site Service | | | |
| A3010, A3020FD | | | £42 |
| A3020HD, A4000 | | | £51 |
| A5000 | | | £68 |

The above must be purchased at the same time as the computer system. Call for further details.

Ink Jet Refills

Why throw away empty inkjet cartridges...
...when you can refill them at a fraction of the cost

Colours available include
Cyan, Magenta, Yellow, Black,
Red, Green, Blue, Brown

| | |
|-------------------------------------|-----|
| Single Refills (req an orig cartr.) | £7 |
| Twin Refills (req an orig cartr.) | £12 |
| Please specify colour(s) required | |
| 125ml Cleaning Kit | £4 |
| 400ml Cleaning Kit | £10 |
| ColourSep software | £15 |

Can be used with DeskJets, BJ's, JP's + others. Ring for further details.

Hardware & Books (All prices exclude VAT)

Pocket Bk/Psion

| | |
|-------------------|------|
| Acorn Pocket Book | £212 |
| Psion 3 256k | £185 |

A-Link for either of the above £51
Call for other peripherals

A3010 Series

Free 3 Year Ext Warranty & On-Site Maintenance

| | |
|-----------------|------|
| Family Solution | £424 |
|-----------------|------|

Connects to std TV. 1Mb RAM, Floppy drive, 2 joystick ports.

Learning Curve Sys £680

As above with 2Mb RAM, Standard Monitor & Learning Curve software.

A3020 Series

Free 3 Year Ext Warranty & On-Site Maintenance

| | |
|--------------------|------|
| Floppy Disc System | £749 |
|--------------------|------|

As A3010 less LC software & joystick ports. Inc Std Monitor, 2Mb RAM.

60Mb Hard Disc Sys £899

As above with 60Mb Hard disc. Add £50 for MultiScan Monitor.

A4000 Series

Free 3 Year Ext Warranty & On-Site Maintenance

| | |
|--------------------|------|
| Home Office System | £999 |
|--------------------|------|

2Mb RAM, Floppy Drive, 80Mb HD, Std Monitor, EasiWriter2, Jr Database

80Mb Hard Disc Sys £949

As above with additional software. Add £50 for MultiScan Monitor.

A4 Portable

Free TrackBall, Spare Batt

| | |
|------------------|-------|
| A4 4MFD Portable | £1399 |
|------------------|-------|

| | |
|------------------|-------|
| A4 4MHD Portable | £1699 |
|------------------|-------|

4Mb RAM, 60Mb HD, 2Mb Floppy Disc, LCD Screen, PC Emulator.
Special offers do not apply to the Acorn Assist Scheme or Assisted Finance Scheme.

A5000 Series

Free 3 Year Ext Warranty & On-Site Maintenance

Learning Curve Syst £1445

2Mb RAM, 80Mb HD, MultiScan Mon, Learning Curve Software.

2Mb/80Mb HD Syst £1399

4Mb/120Mb HD Syst £1599

Add £175 for Microvitec CubScan 1440 Monitor

RAM Upgrades

| | |
|----------------------|------------|
| A3000 up to 2Mb RAM | £45 |
| A3000 up to 4Mb RAM | £129 |
| A3010 up to 2Mb RAM | £39 |
| A3010 up to 4Mb RAM | £128 |
| A3020/A4000 2Mb | £79 |
| A5000 2Mb non exp | £79 |
| A5000 2Mb expandable | £99 |
| A400 RAM | £35 per Mb |
| A540 4Mb | £245 |

Printers

| | |
|---------------------|-------|
| Canon BJ-10ex | £179 |
| Canon BJ-10ex Turbo | £219 |
| Canon BJ-10sx | £209 |
| Canon BJ-10sx Turbo | £249 |
| Canon BJ-10 Sht Fdr | £49 |
| Canon BJ-200 | £299 |
| Canon BJ-200 Turbo | £329 |
| Canon BJC-800 Turbo | £1479 |
| HP DeskJet 500C | £379 |
| HP DeskJet 550C | £529 |
| HP LaserJet 4 | £1099 |
| LaserDirect HiRes4 | £949 |
| LD HiRes4 Card | £349 |

Scanners

| | |
|------------------------|------|
| ScanLight 256 | £199 |
| ScanLight Professional | £549 |
| SCSI Card for above | £139 |

Monitors

| | |
|----------------------------|------|
| Acorn Colour AKF30/40 | £199 |
| Acorn MultiScan | £299 |
| Inc cable for A400/A3000's | |

Microvitec CubScan £399
0.28dp, 40 presets & 3 year warranty

Taxan 795A £469

Upgrades

| | |
|--------------------------|-----------|
| 386PC 1Mb/4Mb | £390/£490 |
| 486PC 1Mb/4Mb | £490/£590 |
| 5.25" Disc Buffer Archi | £39 |
| 5.25" Disc Buffer A5k | £35 |
| ARM3 | £175 |
| Canon BJ Turbo Driver | £42 |
| Colour Card (CC) | £249 |
| DeltaCat Joystick | £29 |
| Dongle Dangle | £6 |
| Dust Covers 2 piece | £12 |
| Dust Cover A30?0 | £8 |
| FaxPack (CC) | £279 |
| I/O Expansion Card | £79 |
| Joystick I/F (All M/C's) | £32 |
| JoyMaster (A3010) | £24 |
| Midi Expansion Card | £65 |
| Micro Mouse (Clares) | £29 |
| Serial Upgrade A3000 | £17 |
| Sound Sampler & Midi | £79 |
| Speedking Joystick | £10 |
| User/Midi Card A3000 | £46 |
| Zip-Stik Joystick | £15 |

Digitisers

| | |
|----------------------------|------|
| Hawk V9 MkII | £279 |
| Hi-Vision Col Digit'r int | £129 |
| Vision Mono Digitiser int | £48 |
| Vision Color Digitiser int | £76 |
| Vision Mono Digitiser ext | £60 |
| Vision Color Digitiser ext | £89 |

RISCOS 3.1 A300 £63.83

RISCOS 3.1 A5000 £16.17

RISCOS 3.1 Others £42.70

Acorn Books

| | |
|-----------------------|--------|
| A3000 Technical Guide | £29.95 |
| A540 Technical Guide | £65.00 |
| A5000 Technical Guide | £65.00 |
| BBC Basic Guide | £19.95 |
| RISCOS2 PRM's | £79.00 |
| RISCOS3 PRM's | TBA |
| RISCOS2 Style Guide | £9.95 |
| 1st Word+ Manual | £10.00 |
| Desktop Dev Env Guide | £25.00 |
| DTP Manual | £10.00 |
| Assembler Manual | £25.00 |
| ANSI C v4 Manual | £25.00 |

Call for books not listed

Other Books

| | |
|------------------------------|--------|
| Archi Game Maker's Manual | £14.95 |
| Archi Assembly Lang Manual | £14.95 |
| Archi Operating System Guide | £14.95 |
| Begin. Guide to WMP Prog. | £12.95 |
| Budget DTP | £12.95 |
| Dabhand Guide to Impression | £14.95 |
| DTP on the Archimedes | £12.95 |
| Graphics on the ARM M/C's | £14.95 |
| Mastering 1st Word+ | £13.95 |
| First Impressions | £35.00 |
| Good Impressions | £30.00 |

Ink Cart/Ribbons

| | |
|---------------------------|--------|
| BJ-10/20 Ink Cartridge | £16 |
| BJ-300 Ink Cartridge | £11 |
| DJ-500 Bk Hi-Cap Cart. | £21 |
| DJ-500C/550C Colour Cart. | £22 |
| Swift24 Mono/Colour | £5/£15 |

Ordering by Telephone

Please specify the goods you require and for which computer. Please have your credit/debit card ready. We will require the cardholders name, address, delivery address if different and the expiry date of the card.

Ordering by Post

Please specify the goods you require and for which computer in writing including your telephone number & delivery address. Send complete with a signed cheque/postal order or alternatively for credit/debit cards, the card number, cardholders name, address, and expiry date. IMPORTANT - Please write your name, address & credit card details in BLOCK CAPITALS to avoid confusion.

Where to Find Us

From the M63 Junction 12 roundabout follow signs to Cheadle A560 passing the glass pyramid. At the 2nd set of traffic lights turn left onto Brinksway. Turn next left onto Chester St and immediately left again onto Ford St. Enter on-site car park via Red Gates on the right hand side.

Terms

EC residents add 17.5%

VAT to all prices except

books. Carriage is free

(except books, paper &

large software applications)

on mainland UK, elsewhere

at cost. Only Credit/Debit

cards accepted for overseas

orders. Prices and

manufacturer's specifications

subject to change without

notification. Goods offered

subject to being unsold and/

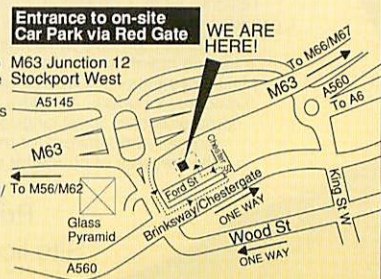
or available. Goods not

offered on trial basis.

Restocking fee on non-

defective returns.

E & OE



Desktop Projects Ltd

Authorised Acorn Dealer (Tel: 061-474 0778, Fax: 061-474 0781)

Unit 2A, Heapriding Business Park, Ford St, Stockport, Cheshire. SK3 0BT

All prices
exclude VAT



QuickShow £25+VAT

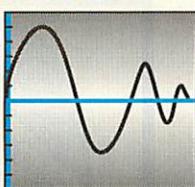
The easy to use slide show presentation and video titling package. Create

!QuickShow
Video Titling
&
Slide Show Presentation
Has never been easier!

sequences of frames containing text of any colour with drop shadows, outline shadows and rubout boxes using the RISCOS fonts. Sprites can also be included in frames and positioned and resized as necessary. Several screens can be linked together with the sequencer which allows you to fade each screen out and in with the many fades provided. Completed sequences can be converted into stand alone applications which when run, shows the sequence without using !QuickShow. 2Mb RAM required and hard disc is recommended.

QuickSnd £10+VAT

Load, play, convert & resave existing Armadeus, Tracker and raw data sound samples and apply special effects including Reverse, Echo, Max Vol, alter replay rate and resample frequency. Convert samples into modules for use with the RISCOS sound system etc. Create stand alone Utility modules which when called, via star commands, automatically play and then remove itself completely from memory (this feature is not available on any other sound package). Use Utility sound modules with RISCOS Alarm to play on activation of an alarm. On screen VU meter included.

**Hard Discs IDE**

The following are complete systems comprising of the NEW Desktop Projects IDE interface, hard disc, mounting brackets, cables, utilities disc and manual.

Archimedes Internal
Archimedes Internal hard discs.
Not suitable for A3k, A3010-A3020

| | |
|------------------|------|
| 40Mb 17ms | £195 |
| 120Mb 16ms Cache | £295 |
| 200Mb 13ms Cache | £395 |
| 330Mb 12ms Cache | £695 |
| 520Mb 12ms Cache | £895 |

A5000 Exchange Drives
These systems are only available for the A5000 only.

| | |
|------------------|------|
| 120Mb 16ms Cache | £200 |
| 200Mb 13ms Cache | £300 |

A3000/Archi External

| | |
|------------------|------|
| 40Mb 17ms | £275 |
| 120Mb 16ms Cache | £375 |
| 200Mb 13ms Cache | £475 |
| 330Mb 12ms Cache | £775 |
| 520Mb 12ms Cache | £975 |

A3000 Hard Cards

| | |
|-------------------------|------|
| 20Mb Internal+User Port | £189 |
| 30Mb Internal+User Port | £189 |
| 60Mb External+User Port | £329 |

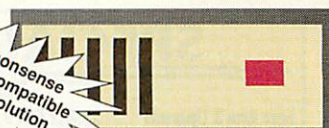
A3010 Hard Cards

| | |
|---------------|------|
| 20Mb Internal | £199 |
|---------------|------|

A3010 Ultimate Multi-Podule HD

| | |
|---------------|------|
| 20Mb Internal | £269 |
| 60Mb External | £399 |

The no nonsense
RISCOS 3 compatible
HardDisc solution

**SCSI**

The following are complete SCSI HardDisc Systems comprising of a Morley SCSI interface, HardDisc, mounting brackets, cables, utilities disc and manual.

Archimedes Internal
Not suitable for A3k, A3010-A3020

| | |
|------------------|------|
| 105Mb 18ms Cache | £429 |
| 180Mb 18ms Cache | £599 |
| 330Mb 12ms Cache | £899 |
| 520Mb 12ms Cache | £999 |

A3000/A300/A400 External

| | |
|------------------|-------|
| 105Mb 18ms Cache | £509 |
| 180Mb 18ms Cache | £699 |
| 330Mb 12ms Cache | £979 |
| 520Mb 12ms Cache | £1049 |

Removable Hard Discs

| | |
|--------------------------|------|
| 44Mb (Inc one cartridge) | £499 |
| 44Mb Cartridge | £55 |
| 88Mb (Inc one cartridge) | £599 |
| 88Mb Cartridge | £99 |

The above are external units with SCSI card.

SCSI Controller Cards

| | |
|-----------------|------|
| Morley Uncached | £139 |
| Morley Cached | £179 |

Acorn/Cumana Multimedia

Acorn Multimedia Expansion System £499
Comprises A4000 style case complete with power supply, SONY multi-session CD-ROM drive, pre-amplifier with headphone/phone inputs/outputs, CD caddy, etc. The unit can also house a 3.5" SCSI hard disc and another CD-ROM drive or Magneto Optical SCSI drive.

Add £100 to above for SCSI Interface (specify for which machine)

Cumana CD-ROM Multimedia Pack £699
Comprises CD-ROM drive, SCSI card, stereo speakers, 6 RISCOS CD-ROM titles, The Hutchinson Encyclopedia, Dictionary of the Living World, Revelation 2, The Illustrated Holy Bible, The Illustrated Works of Shakespeare, Sherlock Holmes on a Disc, ICDPlayer, 3 caddies, etc.

Magneto Optical Drives (SCSI)

| | |
|---|-------------|
| 128Mb Magneto Optical SCSI Drive | £849 |
| External case for above | £99 |
| 128Mb Blank Discs | £39 |

Archimedes, A3000, A5000 Software**Applications**

| | | | |
|----------------------------------|-------------|--|-------------|
| ABC Compiler (Oak) | £77 | Midnight Express (Mid. Graph.) | £39 |
| Advance (Acorn) | £95 | Mogul (Ace) | £20 |
| Ancestry (Minerva) | £59 | Notate (Longman) | £54 |
| Arc DFS (Dabs) | £22 | Ovation (RISC Dev) | £95 |
| ArcComm2 (Logotron) | £52 | PCB (Oak) | £99 |
| ArcLight (Ace) | £40 | PC Emulator (Acorn) | £95 |
| ArcTerm 7 (Serial Port) | £62 | PenDown Plus (Longman) | £68 |
| ArcTurtle (4D) | £20 | Pin Point (Logotron) | £79 |
| Arcist (4D) | £20 | PipeDream 4 (Colton) | £129 |
| Armadeus (Clares) | £65 | Playback (RISC Dev) | £19 |
| Artisan 2 (Clares) | £49 | Poster (4Mation) | £75 |
| Art Works (CC) | £129 | Presenter 2 Hotlink (Lingenuity) | £33 |
| Atelier (Minerva) | £69 | Presenter GTI (Ling) | £66 |
| AUN/Level 4 FileServer (Acorn) | £395 | Pro Artisan (Clares) | £79 |
| Autosketch v2 (Autodesk) | £65 | ProDriver DJ500C/550C (Ace) | £37 |
| Cable News (Lingenuity) | £165 | Realtime Solids Modeller (Sil) | £99 |
| CADet (Minerva) | £139 | Render Bender v2 (Clares) | £99 |
| Chameleon 2 (4Mation) | £35 | Resultz (Colton) | £TBA |
| ColourSep (ICS) | £15 | Revelation II (Logotron) | £110 |
| Compression (CC) | £35 | Revelation ImagPro (Logotron) | £127 |
| Control Panel (Lingenuity) | £14 | Rhapsody v2 (Clares) | £49 |
| Desktop Assembler (Acorn) | £125 | Rhapsody v3 (Clares) | £79 |
| Desktop C (Acorn) | £180 | RISCType (CIS) | £16 |
| Desktop Office (Minerva) | £95 | Rythmn Bed (Clares) | £40 |
| Desktop Publisher (Acorn) | £125 | S-Base Personal (Longman) | £95 |
| Desktop Thesaurus (RISC Dev) | £19 | S-Base Developer (Longman) | £175 |
| Digital Symphony (Oregon) | £40 | S-Base Developer + (Longman) | £275 |
| Draw Print-Plot (Oak) | £39 | Schema (Clares) | £99 |
| EasiWord 2 (Minerva) | £55 | Serenade (Clares) | £109 |
| EasyWriter II (Icon Tech) | £126 | ShapeFX (DataStore) | £9 |
| Einstein (Ace) | £106 | ShowPage (CC) | £130 |
| Equasor (CC) | £37 | SmArt (4Mation) | £50 |
| Eucled 2 (Ace) | £55 | SmArtFiler (4Mation) | £32 |
| Eureka (Longman) | £99 | Snippet (4Mation) | £35 |
| First Word Plus v2 (Acorn) | £65 | Speech! (Superior) | £15 |
| Font FX (DataStore) | £9 | Splice (Ace) | £27 |
| Font Starter Pack (Acorn) | £35 | Squirrel Database (Dig Serv) | £120 |
| Gammplot (Minerva) | £36 | Squirrel 'C' Developers Toolkit | £99 |
| Genesis 2 (Oak Solutions) | £109 | StartWrite (Icon) | £55 |
| Graphbox v2 (Minerva) | £57 | TechWriter (Icon) | £159 |
| Graphbox Pro (Minerva) | £109 | Titler (Clares) | £119 |
| Hard Disc Companion II (RISC) | £45 | Topographer (Clares) | £69 |
| Hearsay II (RISC Dev) | £69 | Touch Type (IOTA) | £39 |
| Hotlink Presenter (Lingenuity) | £41 | Tracker (Serial Port) | £37 |
| Home Accounts (Minerva) | £34 | Turbo-Type (CIS) | £20 |
| Illustrationist (Clares) | £79 | Tween (Ace) | £27 |
| Imagery (Palette Studios) | £69 | TypeStudio (RISC Dev) | £43 |
| Impression v2 (CC) | £125 | Vector (4Mation) | £75 |
| Impression Junior (CC) | £75 | Vox Box (Clares) | £49 |
| Impression Bus Supp (CC) | £39 | WordWorks (CC) | £38 |
| Inter-Sheet II (CC) | £30 | Wordz (Colton) | £95 |
| Inter-Word (CC) | £30 | Worra CAD (Oak) | £83 |
| MasterFile III (RISC Dev) | £47 | | |

Items in red are New/Low price

Games

| | | | |
|-------------------------------------|------------|---|------------|
| 2067BC (Oregon) | £17 | Lemmings (Krisalis) | £19 |
| Aggressor (Atomic) | £18 | Loopz (Audiogenic) | £18 |
| Air Supremacy (Superior) | £17 | Lotus Turbo Challenge II (Kris) | £19 |
| Alderbaran (Evolution) | £26 | Mah-Jong Patience (CIS) | £15 |
| Bambuzle (Arxe Systems) (OS2) | £19 | Mah-Jong The Game (CIS) | £18 |
| Battle Chess (Krisalis) | £22 | Man United Europe (Krisalis) | £19 |
| Black Angel (4D) | £26 | Master Break (Superior) | £26 |
| Blaston (Eterna) | £15 | Micro Drive 2 (CIS) | £26 |
| Blitz (Arxe Systems) | £17 | Mig-29 Fulcrum (Domark) | £25 |
| Blowpipe (Eclipse) | £15 | Nebulus (Krisalis) | £19 |
| Bobby Blockhead (Atomic) | £18 | Oh No More Lemmings (Kris) | £16 |
| Boogie Buggy (4D) | £19 | Omar Sharif's Bridge (Krisalis) | £22 |
| Break 147 & Superpool (4D) | £26 | Orion (Minerva) | £14 |
| Bug Hunt, MoonDash (Min) | £13 | Pandora's Box (4D) 2Mb | £19 |
| Bug Hunt in Space (Minerva) | £13 | Paradroid 2000 (Coin-Age) | £19 |
| Cataclysm (4D) | £19 | Pesky Muskrats (Coin-Age) | £19 |
| Champions (Krisalis) | £22 | Play It Again Sam1 (Superior) | £19 |
| -Includes Man Utd, J Khan Squash, | | -Includes Conqueror, Rotor, | |
| -Wild Class Leaderbrd & Boxing Mgr | | -No Excuses & Hostages | |
| Chess 3D (Micro Power) | £19 | Populus (Krisalis) | £22 |
| Chocks Away 2 (4D) | £19 | Powerband (4D) | £19 |
| Chocks Away Extra Miss(4D) | £15 | Quest for Gold (Krisalis) | £19 |
| Chocks 2 Compendium (4D) 2Mb | £22 | Repton 3 (Superior) | £15 |
| Chopper Force (4D) | £26 | Repton 4 (Superior) | £18 |
| Chuck Rock (Krisalis) | £19 | Rockfall (Eterna) | £16 |
| Cyber Chess (4D) | £26 | Real McCoy 2 (4D) 2Mb | £26 |
| Cyborg (Alpine) | £19 | -Includes Apocalypse, Holed Out, | |
| Cycloids (Software 42) | £19 | -The Olympics & Inertia | |
| Dreadnoughts (Turcan) | £26 | Real McCoy 3 (4D) 2Mb | £26 |
| Dungeon (4D) | £26 | -Includes Powerband, Nevryon, Drop | |
| Elite (Hybrid) | £32 | -Ship & The WIMP Game | |
| Enter the Realm (4D) 2Mb | £19 | Real McCoy 4 (4D) | £26 |
| E-Type Compendium (4D) | £19 | -Includes Galactic Dan, Grievous | |
| Fervour (Clares) | £19 | -Bodily 'ARM, Cataclysm & X-Fire | |
| Galactic Dan (4D) | £19 | Saloon Cars Deluxe (4D) | £26 |
| GODS (Krisalis) | £19 | Saloon Cars Del Extra Courses | £16 |
| Gribbly's Day Out (Coin-Age) | £19 | Sim City (Krisalis) | £26 |
| Grievous Bodily 'ARM (4D) | £19 | Spheres of Chaos (Matt Black) | £19 |
| Guile (Dream) | £22 | Starch (Dabs Press) | £12 |
| Heimdall (Krisalis) | £22 | Superior Golf (Superior) | £19 |
| Hero Quest (Krisalis) | £22 | Sup Golf Extra Courses (Superior) | £14 |
| Holed Out Compendium (4D) | £19 | SWIV (Krisalis) | £19 |
| Ibix the Viking (Minerva) (OS2) | £14 | Technodream (Superior) | £19 |
| Iron Lord (Cygnus) | £19 | ThunderMonk (Minerva) | £14 |
| Ixon (Software 42) | £19 | Tiles (Brain Games) | £16 |
| James Pond (Krisalis) | £19 | Top Banana (HEX) | £19 |
| Kerbang (Eterna) | £15 | Twin World (Cygnus) | £14 |
| Krisalis Collection | £22 | Waterloo (Turcan) | £19 |
| -Includes, Mad Professor Mariarty, | | X-FIRE (4D) | £15 |
| -Pipemania, Terramex & Revelation | | Zarch (Superior) | £19 |
| Lost Ninja (Superior) | £19 | Zool (Gremlin Graphics) | £22 |
| Legend of the Lost Temp (OS2) | £19 | 2Mb - RAM required for RISCOS3.1 | |
| | | OS2 - Runs on RISCOS2 only | |

Education

| | |
|--|------------|
| Adv. Playground 5+ (Storm) | £17 |
| Amazing Ollie 4+ (Storm) | £14 |
| Badger Trails (Sherston) | £30 |
| Coffee 9+ (Storm) | £28 |
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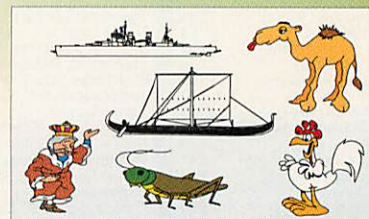
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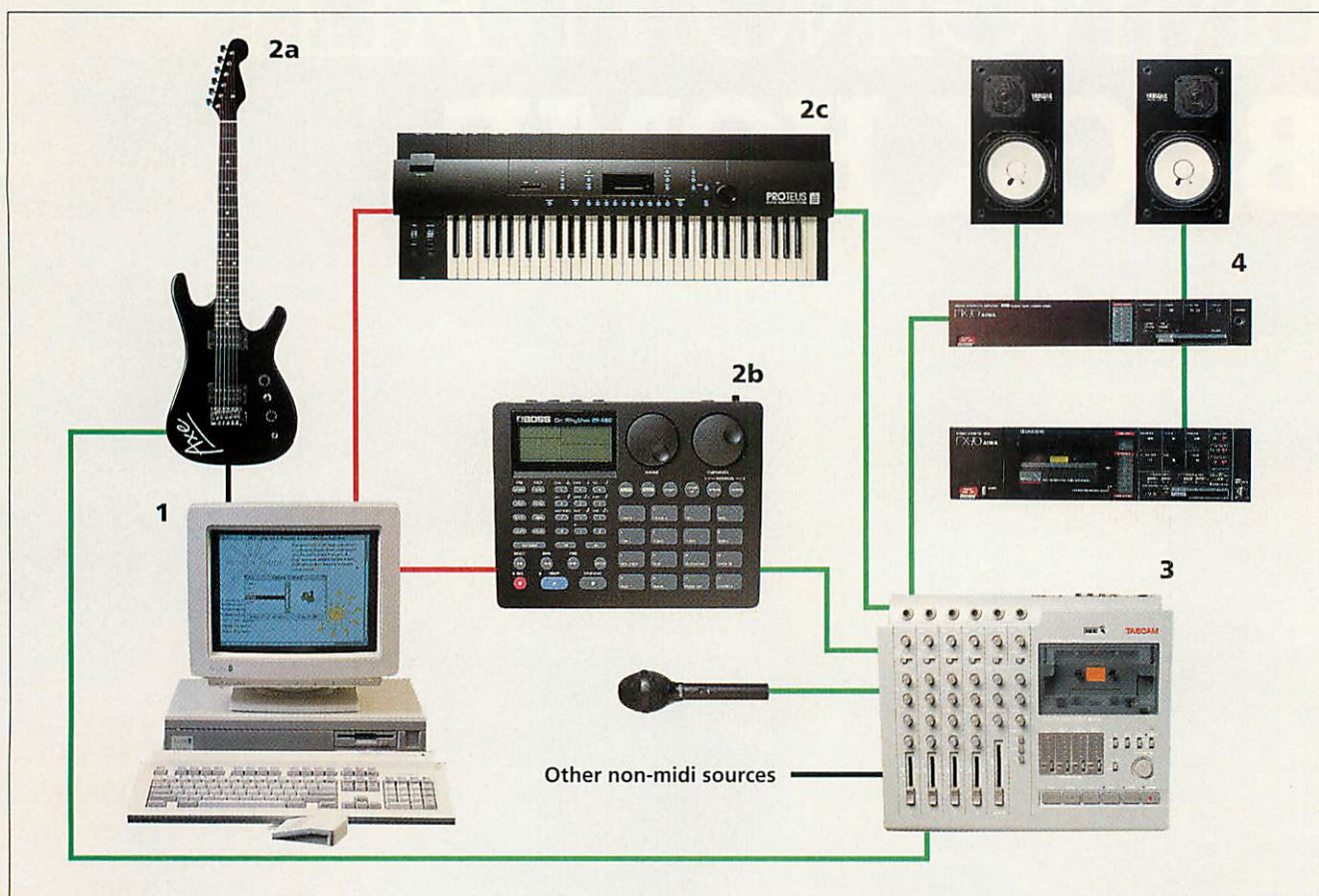
BRINGING IT ALL BACK HOME

Richard Garrett looks at how the Archimedes can become the core of a home recording studio

John Graham is a semi-pro musician. He writes and records his own music, plays guitar in a couple of bands and does occasional work as a sound engineer in a recording studio. Not content with this, he now wants to branch into music technology.

'Although I do some studio work, I record my own stuff at home,' John told us. 'I have a small home studio which

consists of a Tascam 488 eight-track recording studio plus a Roland GR50 guitar-



The A5000 with EMR midi podule fitted (1) is now central to John's home studio. Connected to it with 16 channels apiece would be the guitar synthesiser (2a), the drum machine (2b) and the new keyboard (2c). These are then connected to the portastudio (3) and finally played on the hi-fi equipment (4)

COLOUR KEY: ———— Midi data ———— Audio signals ———— Non-midi data

synth, a Yamaha drum machine, amps, a microphone, and some outboard fx units: reverb, delay and so on.

'For years, my approach to recording has been to punch a complete song structure into a drum machine, record it in stereo on two tracks of the eight-track and, once I've done that, play guitars, bass and acoustic piano onto the other tracks. When a tune is finished, I mix it down onto Dat (digital audio tape).

'This approach is fine, but arrangements are cast in stone from the beginning. With Midi sequencing, I could write arrangements on the computer with electronic instruments playing all the non-improvised bits, then battle with all those parts to produce a synthesised version before I put anything on tape. That way, drums could respond to the overall sound instead of dictating it.

'I'm obviously going to need a Midi keyboard for this but I've got enough synth stuff

on the GR-50, so I want something more natural. On the software side, I want something that can display music notation but since I've played solos into notation software before, only to be presented with bizarre hemi-demi-semiquavers, I would like to have other display formats as well.

'I also want the ability to tidy up my keyboard playing without getting too metronomic and to add and delete verses, choruses and so on without loads of editing.

'Also, the material I write is quite complex, and I've heard that Midi can get flooded with information. Is there a way around this? I've about three and half grand to spend and I'd like to split it evenly between the computer and synth.'

THE SOLUTION

We would recommend an A5000 with an ElectroMusic Research Midi 4 podule. Three-box hard disc computers

lend themselves to music, because it's easier to organise their component parts around the Midi equipment. When Midi podules for the A4000 are available they may offer a cheaper alternative.

Unlike most Arc Midi interfaces which only carry one Midi in and one Midi out socket, the Midi 4 features four independent Midi ports, each with its own input and output. Each port can carry 16 channels of Midi data. This means the device could, potentially, address 64 synthesiser voices at one time and play about 80 notes. It would also give the illusion of doing so simultaneously.

It is unlikely that John's current setup will generate anything like this quantity of data. The advantage of a multiple port interface is that his GR-50 can be given its own pair of sockets, maximising the bandwidth available to it and minimising the chances of Midi clog. On his setup as it is

now, each Midi device could have sixteen channels.

For a keyboard, I'd suggest an E-mu Proteus MPS Plus. This is a playable instrument that generates around 400 orchestral and pop sounds from high quality samples.

As for software, Clares' suite of music packages is the best bet here. This is made up of a piano-roll sequencer, a drum editor, and a notation editor: *Serenade*, *Rhythm Bed* and *Rhapsody 2* respectively. With this combination, he can record Midi signals direct from his guitar synth or keyboard using *Serenade*, create drum patterns in *Rhythm Bed* and sync them together to produce up to 16 Midi tracks.

Once he's written music on the sequencer, he can change tempo, duplicate sections and move them in the arrange window, to get the sound he wants. He can save work in Standard Midi File format then pass it to *Rhapsody* to convert to notation dots.

TECHNIQUES

Many Midi-capable programs can record notes from the keyboard and play them back but not all are full-blown sequencers. What distinguishes a true sequencing package like *Studio 24 plus* or *Serenade* from the rest is the capacity to record all incoming Midi data in real time, with sufficient accuracy to retain the phrasing of the music played. This being the case, this month's techniques concentrate on the process of real-time capture of Midi data and how to edit out any mistakes which you made in your playing.

Serenade is a grid edit sequencer; it represents notes on a bar graph similar to the paper rolls used to program a player piano. The horizontal axis shows time in bars and the vertical axis shows pitch values as a piano keyboard. From the main window or grid, you can call up various editors including the Track Sheet, Event List and the Arrange window. The main window has three modes: Draw/Edit, Cut & Paste and Record/Playback, which is where we'll start.

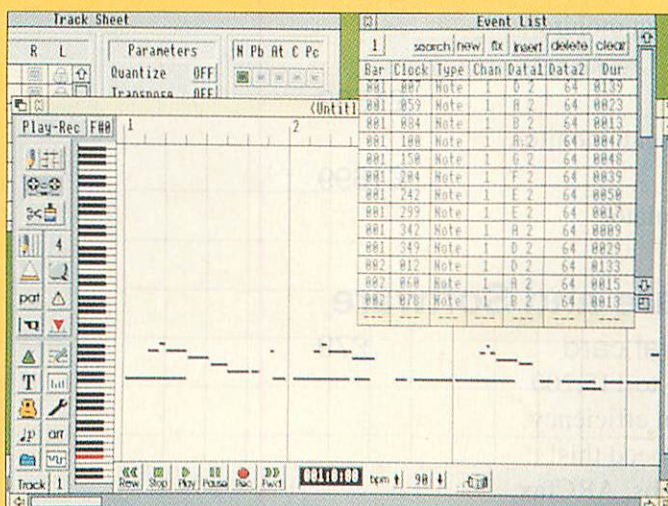
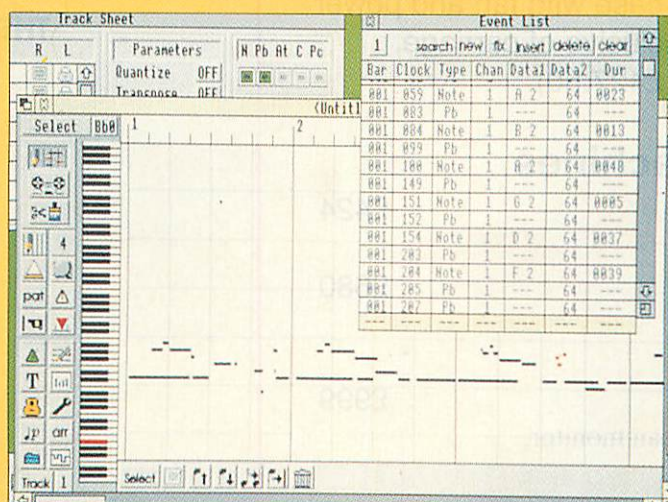
Recording Midi data into *Serenade* is much like recording real sound into a multitrack tape recorder. In an analogue studio, the engineer would often start a session by recording a metronome beat (click track) at the desired tempo for the song. This supplies an accurate reference, mostly for the drummer, so subsequent tracks keep steady time. *Serenade* has a built-in metronome. You can set this to any Midi channel, note and volume (I use the closed hi-hat cymbal on my drum machine) so it plays on every beat of your song.

To record a track, you must first 'record enable' it in the track list window then hit Record and Play on the tape recorder controls at the bottom of the window. When you do this, an advice box appears saying 'recording on track 1', or whatever, and the tape counter turns red, counting down for four beats and playing the metronome before recording any Midi data. This is the count in, the computer's way of shouting 'one, two, three, four...' at the start of the tune. After the count, the tape counter turns black, starts counting bars elapsed and records whatever you play.

When you've finished playing, you click on the Stop icon and black lines will appear on the grid showing the pitch and durations of the notes you have played. The top screenshot shows typical output of a guitar synth with the Event Editor open. This demonstrates all the pitch bend data (marked Pb) recorded, as well as unwanted 'grace notes' produced by strings bending and squeaking under the player's fingers. Having got the data in, you can edit out unwanted notes from the Draw/Edit mode and alter or remove pitch bend information from the Event List. Alternatively, you can trash all the pitch bend data on that track from the Track List. The top screenshot shows the original track in *Serenade*: the lower shot shows the same guitar phrase after editing, with all the pitch bends removed and a few notes added and taken away.

If you record some mistakes, there are two ways to patch the track up. One is to use cut and paste-style edit controls to copy a better-played version of the phrase from elsewhere in the tune and use that to replace the faulty part. The other way is to record the section again by letting the 'tape' run until you get to the bit you want to change and then hitting the record button. Recording engineers call this a drop in and it's harder than it sounds, especially when you've got both hands on a guitar. *Serenade* has an automatic drop in feature. From the small menu on the record button, you 'auto' option, then record the track again. No data is written into the sequencer until a Midi note is received from the instrument you're playing. When *Serenade* hears the note, it records from that point until you drop out by selecting the Stop icon.

Once you have one track recorded, you go on recording others and build up whole tunes and produce arrangements, using *Serenade* to play repeated groups of bars (verse/chorus and so on) in a specific order. This is done using a simple editor called Arrange window, where adding an extra chorus is a matter of one mouse click. All an awful lot easier for John than the arduous task of typing an extra sixteen bars into the dmc.



Serenade (reviewed last month) can address multi-port Midi cards, has sufficient resolution to accurately capture his phrasing and has quantisation features, to tidy up his keyboard playing.

For John, one of its most important features is the ability to edit all Midi data, not just the notes. From the Event List, he can not only change note lengths and start times, but also edit the control signals that create vibrato effects, fix the stereo position of instruments, and so on.

THE FUTURE

The hardware and software for the complete computerisation of John's home studio costs over £3000 but it doesn't have to stop there.

Other options include other Midi-controlled devices or time synchronisation with the portastudio. For the present, however, John's priority will be to concentrate on mastering the software and *Serenade* should be enough to keep most musicians happy for quite some time.

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Product: Proteus MPS keyboard
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SOFTWARE

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Product: *Rhapsody 2*
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Product: *Rhythm-Bed*
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Graphics on the Acorns has been poorly covered in print until now. Rob Miller looks at a book that aims to set that right

PICTURE BOOK

Arc-related books have always been a bit thin on the ground, and graphics is an area that has been particularly badly covered. *Graphics on the ARM Machines* aims to rectify the situation although it does not claim to be a beginners guide: a point made clear early on.

The book is divided into four rough sections: an explanation of vector (or line) graphics; an explanation of bitmap (or pixel) graphics; an explanation of other graphics techniques, such as ray tracing, image processing and animation; and a series of appendices detailing such areas as printing.

While you can jump around from section to section, terms used later in the book often relate to those discussed earlier, so it is easier to take the book in chapter order. Throughout each section, references are made to actual programs where possible and relevant. So, in the chapters covering vector graphics, *Draw* is discussed and each of its features explained. As in the rest of the book, some experience of the product is assumed, the author doesn't try to replace the manual.

Where the book really scores, though, is in its explanation of how and why tools in *Draw* work the way they do. In particular, the mysterious 'Winding rule' suddenly becomes clear and easy-to-understand. The liberal sprinkling of hints throughout also clarifies some of the more obscure features of *Draw*.

Because *Draw* and *Paint* are available to anyone with an Acorn 32-bit computer, both are used as examples and discussed at length. Roger Amos also takes a detailed look at programs in the public domain (free from PD libraries and therefore accessible to everyone), or that are unique in their field, like 3D editor *Euclid* and associated programs.

Other packages are looked at more briefly, partly because there are so many, partly because an in-depth study of, say, Computer Concept's *ArtWorks* would fill a book. *ArtWorks* does get a mention, though, as does 4Mation's *Vector* and Logotron's *Revelation 2* (since superseded by *Revelation Image Pro*).

It doesn't matter particularly if you don't have all the software discussed to hand, many of the concepts can be applied

to similar programs. Both *DrawPlus* and *Vector*, for example, are mentioned, the former being a cut-down, shareware version of the latter.

While the author makes a worthy stab at getting ideas across in plain English, jargon is unavoidable. Even though obscure terms are explained as they are introduced, no glossary is provided. This would have helped the novice, who has to constantly flick back.

There are omissions. No real mention is made of graphic languages such as *Logo*, and complex areas, such as ray tracing, are covered superficially. In a book with such a broad brief, though, it is inevitable some programs will be left out.

The author covers most topics and ideas through his method of explaining and using the programs. The text is clear throughout, with plenty of pictures and diagrams illustrating points. A colour section in the centre of book including the picture above gives a good idea of what you can achieve.

CONCLUSION

The book is certainly not for the absolute beginner, but neither will it advance the

knowledge of experienced graphics users. I would guess the target reader would be someone with some experience of the Archimedes, but who wants to know more about graphics before laying out money on extra software or hardware. For this person it's £15 well spent, and, furthermore, is really the only book of its kind.

PRODUCT DETAILS

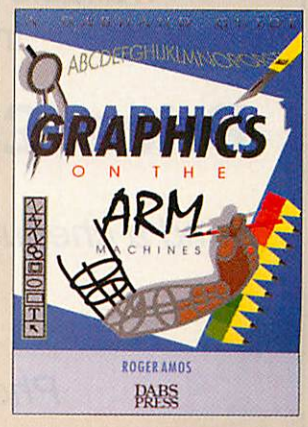
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BACK TO THE DRAWING BOARD

John Nolan runs the rule over ProCAD, the new Arc package which claims to be a contender to AutoCAD at a fraction of the cost

Right at the start *ProCAD*, the latest CAD product from Minerva, proclaims itself to be a drafting package. Not, you may note, a design package. For an industrial designer or architect, the design *is* the drawing; looks are what count. For the engineer, design goes deeper than this: it is the calculation process behind the drawing.

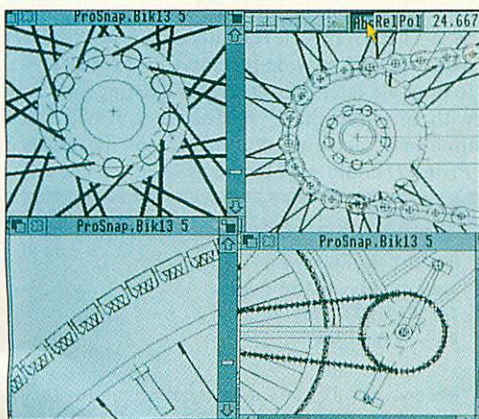
From this point of view, Minerva's description is accurate. *ProCAD* is a drafting package. It is aimed at architects, planners, mechanical, civil, electrical, and electronic engineers – anyone, in fact, who needs a package for fast, accurate drafting.

SURVEYING THE PROCAD SCENE

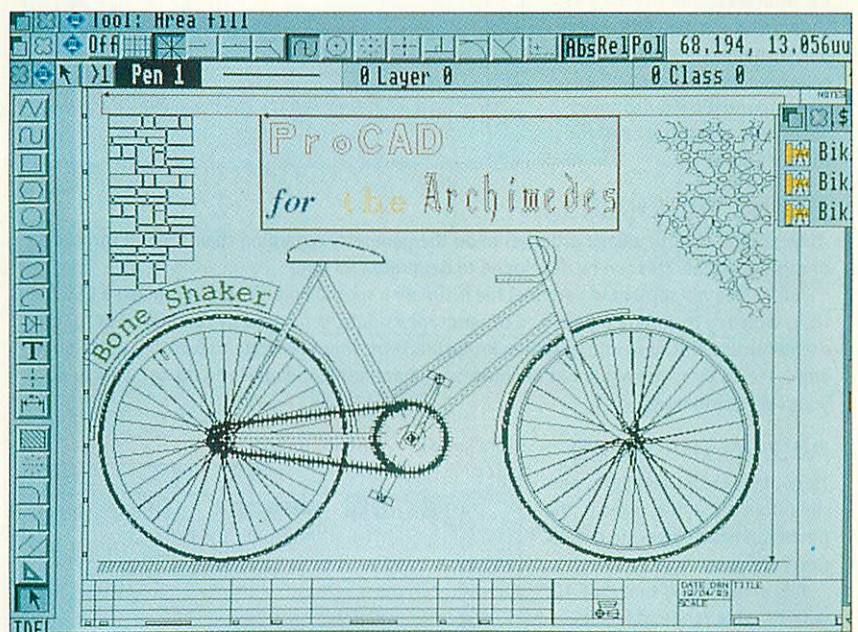
CADet, a cheaper version of *ProCAD*, was reviewed in the April *Acorn User* and displayed technical drawing to BS308 standard. *ProCAD* is the next step up and, in Archimedes terms, is expensive. However, *ProCAD* does claim to be comparable to *AutoCAD*, the very costly PC-package which is now the industry standard.

As one might expect, *ProCAD* shares some features with *CADet*, including tools, snaps, symbols, symbol manipulation, global update of symbols and multicopy. *ProCAD* does have more ready-made drawings and more extensive symbol libraries than *CADet*, though.

More important still, it has extra tools with additional functions and more snaps. *ProCAD* also employs user-definable scales, taking information from the drawing and using it to perform arithmetic, generate reports and bills of quantity. Symbols are stored in parametric form, so one symbol can generate many variations by



Detail where it counts is an important consideration



The bicycle provides a standard test for a drafting package

FEATURE CHECKLIST

| | CADet | ProCAD | AutoCAD |
|--------------------------------|-------|--------|-----------|
| Price (ex VAT) | £145 | £495 | £2800+ |
| Platform | Arc | Arc | PC 486 |
| Ram needed | 1Mb | 1Mb | 4Mb |
| Disc space needed | – | – | 42Mb |
| Multi-task | Yes | Yes | Very slow |
| Accurate snaps | Yes | Yes | Yes |
| Object grouping | Yes | Yes | No |
| Global symbol update | Yes | Yes | No |
| Instant symbol variation | No | Yes | Yes |
| Architectural fills | No | Yes | Yes |
| Multiple undo | Yes | Yes | Yes |
| DXF supported | No | Yes | Yes |
| CSV supported | Yes | Yes | No |
| Bills of materials | No | Yes | Yes |
| Reports from text objects | No | Yes | Yes |
| Isometric ellipses and circles | No | Yes | Yes |
| Maximum paper size | A3 | A0 | A0 |
| Plot CAD or HPGL files | Yes | Yes | No |

PROCAD IN ACTION

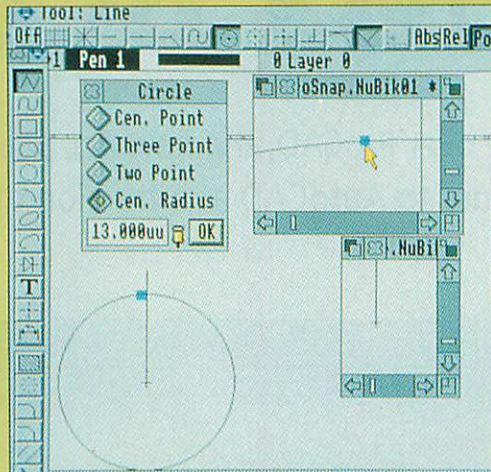
To demonstrate how *ProCAD* works in more detail, I chose to construct a bicycle, since it tests a number of engineering drafting processes: from the detail found in the chain and sprockets, to the overall shape of the bicycle itself.

SHAPE MAKER

The first decision is one of scale. I decided on a 40in x 68in bicycle which was then drawn at a 1/5 scale on an A3 frame.

You have to define your own scale factor, give your scale a two-letter name and *ProCAD* does the rest.

A base line is drawn first, then the outlines of the wheels – as shown in the screenshot – all quickly and accurately. Although snaps can be used in combination, I found it better to select only those snaps you need for the next point.



FITTING THE CHAIN

At this point, I wrote a Basic program to do the geometry regarding chains round sprockets of different sizes. This can be developed to generate CSV data.

A CSV (comma separated variable) file is simply a special Edit file which is given a CSV file type, with x, y co-ordinate pairs and other graphics data, separated by commas. *ProCAD* can then translate this data into graphics. *ProCAD* accepts input accurate to 0.001in. or 0.025mm. and 0.1° and there are a number of sources for standard CSV data if you do not wish to do your own calculations.

ADDING THE TREAD

The outline circles and lines, possibly from a CSV file, provide the guides on which accurate details can be hung.

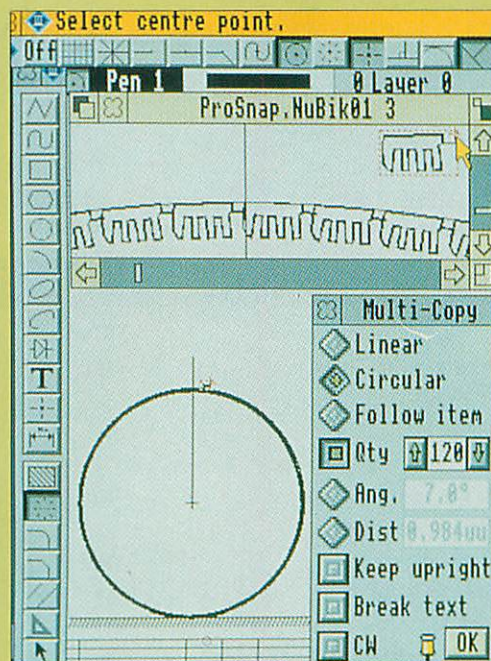
It is in this detail that *ProCAD*, with its wide range of facilities, really comes into its own. Making extensive use of the circular multicopy, I drew the tread round the tyre very easily. Let's take a look at the drawing of the tread. The pattern repeated every 3° was used to give a realistic effect. Enlarged views are made to improve accuracy.

A vertical construction line provides an intersection, as a reference point for the tread pattern. An accurate point 3° to the left of the intersection is made using polar co-ordinates.

The line thickness is 0.01in. The point co-ordinate is input as (13,93°), via the co-ordinate window. For Multicopying, the tread pattern must be grouped and the reference point placed at the construction line intersection.

The results of multicopy can be seen in the shot. Due to *ProCAD*'s accuracy, only the number of copies (in our example 120) needs to be entered in the dialogue box, not the number of degrees (in this case 3°). In this mode, two points were selected, the Centre Point (in this case the centre of the wheel) and the Start Point (here the vertical construction line intersection). You have to wait a few seconds before seeing the tread drawn around the wheel. On the subject of drawing speed, the bicycle file, with a short symbol list, is over 210K. Some optimising of memory is probably necessary.

Although we chose a bicycle as our example, Minerva cites many other uses, such as architectural design – in fact any task which requires accurate drawings to scale.



changes in shape, size and orientation on the drawing. *ProCAD* also uses automatic dimensioning and a degree of calculation; for instance, units can be entered as 15/5.

ProCAD's great merit is versatility. The package can import and export graphics as *AutoCAD*-compatible DXF files. There is plenty of DXF data available, some in the public domain, some from RIBA (The Royal Institute of British Architects).

This means that *ProCAD* can call on a wide, and expanding range of graphics information in DXF files and symbol libraries. Secondly, *ProCAD* can carry out design work via Basic programs or spreadsheets, and load the data via CSV files.

PROCAD IN USE

For those familiar with *Draw*, *ProCAD* is very user-friendly and many features can be reconfigured by the user. The multiple undo feature and the promptings from the message bar speed up the learning process enormously but there is also a tutorial included in the price.

It is difficult to cover all of *ProCAD*'s features in this article, so we chose to construct a bicycle to show you the package in action (see our boxout). Many different features were used in the process: for example, there is a whole army of techniques available to hide the part of the bicycle spoke that runs behind the forks. I used Break and Cutout to remove the unwanted part of the spoke.

Then there is Object Editing and Extension Lines. Objects can be placed in different layers (there are 32). A layer can be made non-selectable to protect it. It can also be made completely invisible. These layers might be particularly useful for, say, a building design, where a given floor could have different drawings for room layout, services or dimensions. If this is not enough, there are levels that alter the way objects sit above one another: useful for selecting overlapping features.

There are many other powerful features including reports on the material used, complete with costings. There are bugs but this is to be expected in the early stages of such a complex package – *ProCAD* only debuted in January this year. Most of the bugs were minor and were corrected immediately by Minerva.

CONCLUSION

If your budget is tight and you can afford to sacrifice certain features, *CADet* is more suitable as a cheap entry level alternative to *ProCAD*. Minerva will provide incentives for *CADet* users to upgrade later. However, for existing Arc users with an immediate, professional need, where time and accurate drafting are of the essence, *ProCAD* could well be the answer.

PRODUCT DETAILS

Product: *ProCAD*
Supplier: Minerva Software
Tel: (0392) 737756
Price: £495 + VAT

Minerva provides an evaluation disc for *CADet* or *ProCAD*, costing £5, refundable with order.

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SCHOOL CHILDREN PROVE THAT NEW BYPASS WILL DAMAGE THE LOCAL ENVIRONMENT

EXCLUSIVE

BY
MATTHEW
DAVIES

USING an innovative new program on their classroom computer children from St. Chad's School have shown town planners that a proposed new bypass would have a detrimental effect on their local environment.

The children surveyed the local area and fed details into their Topographer program, which allows them to look at the relevant area in 3D. They then added the new road along its proposed route and it became obvious that the road would not only affect an area renowned for its badger population but would also

distract children in the classroom as they would be able to see traffic moving along the new road.

The children even went as far as to propose a new route for the road to the town planners. The proposed route would have a negligible impact on the area but still provide the much needed relief to existing roads.



A SERIES of sweeping proposals which would abolish free parking in district shopping centres, change some bin collections, increase lettings charges and scale down mileage claims by some council officers, have been announced by Labour.

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Topographer is a major application for the Geography curriculum which allows children (and teachers) to have lots of fun whilst learning all about maps, contour lines, valleys, rivers etc. In fact *Topographer* covers virtually all items found on a map.

The real breakthrough with *Topographer* is its 3D section which allows you to convert a 2D map into a 3D model on screen. Imagine turning a set of flat contour lines on a 2D map into a 3D model which clearly shows the hill — no more cardboard cut out models or papier mache! You define where you look from, and what you look at.

Topographer also covers aspects of the IT and maths curriculum with its modelling capabilities. Just stop for a minute and think of the projects that you could do with *Topographer*. You could make

a map of the local area with churches, pubs, woods etc. and then view it from various places. If there is a bypass proposed you could add it in to the existing landscape and see where it is visible from and what impact it is likely to have on the community. I'm sure you can think of a hundred and one topics.

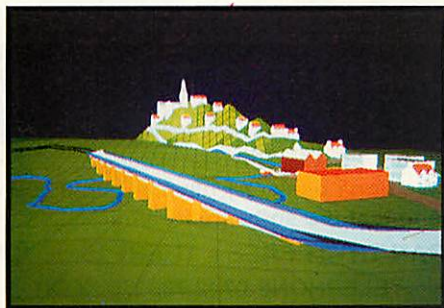
◆ Fully RISC OS 2 & 3 Compliant and 1 megabyte friendly ◆
Suitable for all ages from 6 onwards ◆ Easy and quick entry of all symbols (over 100) ◆ Wooded areas which translate into impressive 3D landscapes ◆ Definable map size and scale which can be linked to the national grid references ◆ Powerful 3D mode

giving a true representation of the landscape ◆ Stunning 3D models which can be saved as a sprite file for use with other applications.

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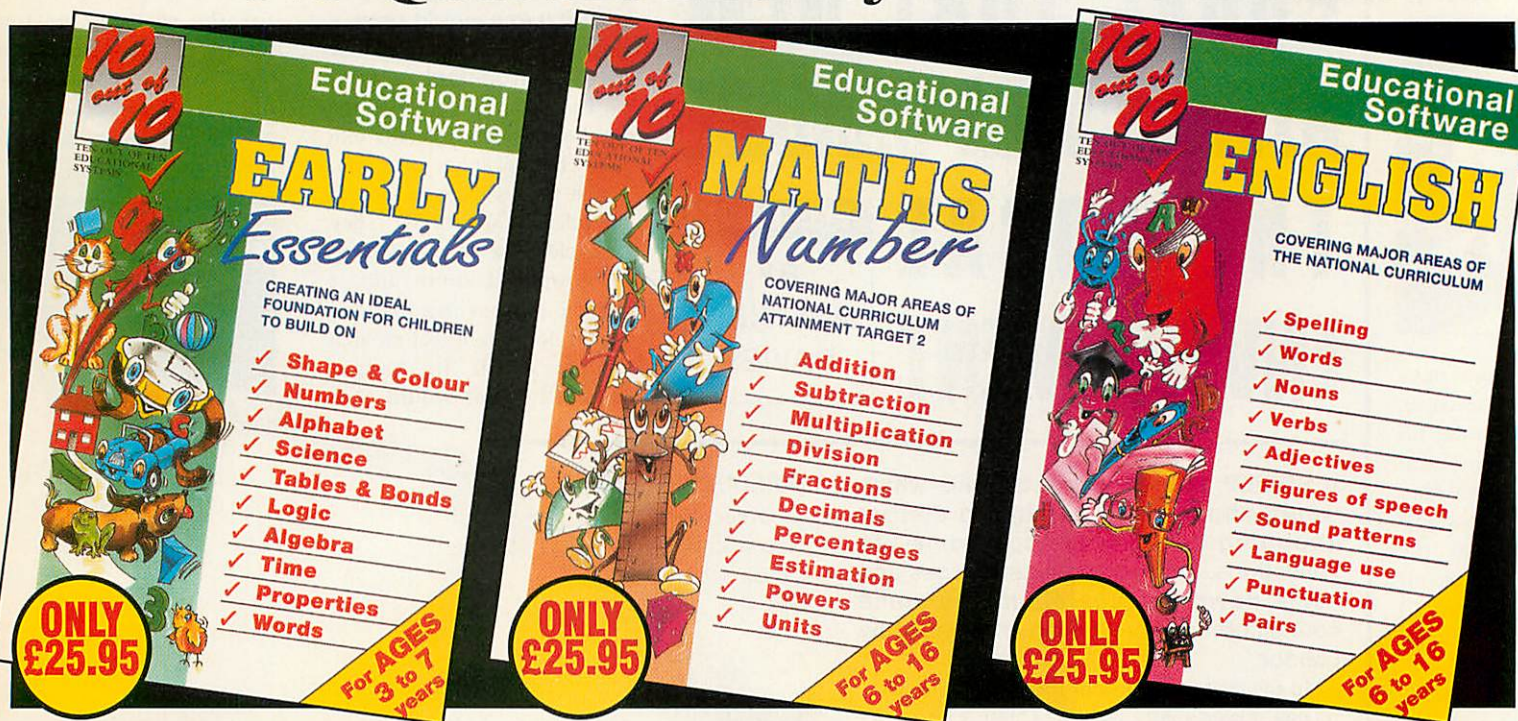


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Early Essentials For Children Under 7 Years

Subject Areas Covered

| | | |
|---|---|---|
| Gnasher | Shape Col | Grab It |
| G1: Recognise simple shapes and colours | G1: Check shape and colour knowledge | G1: Check shape and colour knowledge |
| G2: Learn the order of the numbers 1 to 10 | G2: Reading simple alpha-numeric look-up tables | G2: Reading simple alpha-numeric look-up tables |
| G3: Learn the alphabet - with pictorial clues | G3: Improving reading vocabulary | G3: Improving reading vocabulary |
| G4: Simple sequences including odd and even numbers | G4: Recognising characteristics (size + shape + colour) | G4: Recognising characteristics (size + shape + colour) |
| G5: Discover properties of common objects | G5: Reading and understanding two-way tables | G5: Reading and understanding two-way tables |
| G6: Experiment with numbers and operations | G6: Identifying scientific diagrams | G6: Identifying scientific diagrams |
| Link Up | Stones | Cover Up |
| G1: Match and link shapes and colours | G1: Understanding number conservation | G1: Understand the meaning of push and pull |
| G2: Learn to count up to ten | G2: Stepping through the alphabet | G2: Following letters in alphabetical order |
| G3: Recognise the link between upper and lower case | G3: Patterns of growing and shrinking shapes | G3: Associating words and pictures |
| G4: Link two shapes to composite pattern | G4: Learning to tell the time | G4: Elementary algebra - "find a number" problems |
| G5: Match analogue to digital clocks | G5: Practising number skills | G5: Knowledge of everyday items |
| G6: Know a selection of simple words | G6: Using common sense to follow a sequence | G6: Accurate and rapid time recognition |
| Artist | Racer | |
| G1: Colour and coordination skills | G1: Understand the meaning of push and pull | |
| G2: Counting with colours | G2: Following letters in alphabetical order | |
| G3: Number stories with coloured rods | G3: Associating words and pictures | |
| G4: Following rules to recognise attributes | G4: Elementary algebra - "find a number" problems | |
| G5: Pattern and symmetry through shape and colour | G5: Knowledge of everyday items | |
| G6: Beginning a basic science vocabulary | G6: Accurate and rapid time recognition | |

Maths (Number) For Children 6 to 16 Years

Levels of Attainment Target 2 Covered

| | | |
|---|--|--|
| Carnival | Grab It! | Silicon Brain |
| G1: 2a.1 Know and use addition facts up to 10 | G1: 3a.1 Use decimal notation with money | G1: 2b.1 Recognise simple words (adjectives) |
| G2: 3c.2 Understand remainders in a calculation | G2: 3b.2 Know and use the 2, 5 and 10 times tables | G2: 2a.2 Read and understand Signs, Labels Notices |
| G3: 4a.2 Multiplication facts up to 10 x 10 | G3: 4a.5 Mental subtraction of 2 two-digit numbers | G3: 3a.3 Capital letters full stops and question marks |
| G4: 5b.2 Calculate percentages of quantities | G4: 4a.6 Mental addition of several single-digit numbers | G4: 2b.1 Retrieve information (Abbreviations etc.) |
| G5: 6a.5 Relate equivalent fractions to decimals | G5: 6b.1 Estimate multiplication and division | G5: 2b.5 Literary devices (Pronouns) |
| G6: 8c.1 Use of estimation to check size of answers | G6: 7a.2 Division of multiples of powers of 10 | G6: 3b.1 Grammatical constructions (Passive Tense) |
| Cover Up | Cheers | Word Fit |
| G1: 3a.4 Know and use subtraction facts up to 20 | G1: 2b.1 Whole number add and subtract problems | G1: 4c.1 Spelling patterns (blends) |
| G2: 3b.1 Multiplication facts up to 5 x 5 | G2: 3d.2 Make estimates based on familiar units | G2: 4c.2 Awareness of word relationships (synonyms) |
| G3: 4a.4 Mental addition of 2 two-digit numbers | G3: 4a.14 Solve multiplication and division problems | G3: 3a.1 Sentence structure |
| G4: 4a.10 Division of two-digit nos. by single digits | G4: 5d.1 Imperial units in daily use | G4: 2b.5 Awareness of choice of words |
| G5: 6a.4 Using equivalence of fractions (and ratios) | G5: 5d.4 Use index notation | G5: 2b.3 Unconventional spellings |
| G6: 8a.10 Convert fractions to percentages | G6: 8b.2 Four rules of fractions | G6: 4b.6 Common misspellings |
| The Big Bang | | |
| G1: 2a.2 Know and use subtraction facts up to 10 | | |
| G2: 3a.3 Know and use addition facts up to 20 | | |
| G3: 5a.3 Multiplication of single-digit powers of 10 | | |
| G4: 5a.4 Mental division of single-digit powers of 10 | | |
| G5: 6a.8 Percentage changes | | |
| G6: 6a.9 Convert fractions to decimals | | |

English For Children 6 to 16 Years

Attainment Targets and Levels Covered

| | | |
|--|---|---|
| Sniper | Grab It | Librarian |
| G1: 4b.1 Simple monosyllabic words | G1: 2c.1 Read a range of simple material | G1: 2c.1 Use initial letters to recognise words |
| G2: 2a.1 Read and understand Signs, Labels Notices | G2: 2c.2 Phonics cues in reading | G2: 4c.2 Spell a wider range of words (plurals) |
| G3: 3a.3 Capital letters full stops and question marks | G3: 3a.3 Structures of English (Collective nouns) | G3: 3a.3 Structures of English (Collective nouns) |
| G4: 2b.1 Retrieve information (Abbreviations etc.) | G4: 3b.2 Use of the Apostrophe | G4: 3b.2 Use of the Apostrophe |
| G5: 2b.5 Literary devices (Pronouns) | G5: 2b.7 Choose vocabulary | G5: 2b.7 Choose vocabulary |
| G6: 3b.1 Grammatical constructions (Passive Tense) | G6: 3c.4 Lexical features | G6: 3c.4 Lexical features |
| Cover Up | Cheers | Word Fit |
| G1: 2b.1 Recognise simple words (adjectives) | G1: 3b.6 Check for consistent use of comparatives | G1: 4c.1 Spelling patterns (blends) |
| G2: 2a.2 Read and understand Signs, Labels Notices | G2: 3b.6 Simple use of past tense | G2: 4c.2 Awareness of word relationships (synonyms) |
| G3: 3a.3 Capital letters full stops and question marks | G3: 3a.3 Structures of English (Collective nouns) | G3: 3a.3 Structures of English (Collective nouns) |
| G4: 2b.1 Retrieve information (Abbreviations etc.) | G4: 3b.2 Use of the Apostrophe | G4: 3b.2 Use of the Apostrophe |
| G5: 2b.5 Literary devices (Pronouns) | G5: 2b.7 Choose vocabulary | G5: 2b.7 Choose vocabulary |
| G6: 3b.1 Grammatical constructions (Passive Tense) | G6: 3c.4 Lexical features | G6: 3c.4 Lexical features |
| Word Fit | | |
| G1: 4c.1 Spelling patterns (blends) | | |
| G2: 4c.2 Awareness of word relationships (synonyms) | | |
| G3: 3a.1 Sentence structure | | |
| G4: 2b.5 Awareness of choice of words | | |
| G5: 2b.3 Unconventional spellings | | |
| G6: 4b.6 Common misspellings | | |

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IN BRIEF

Puzzling jigsaws for juniors, furnishing for 3D fans and colour printing for Canon BJ-10 owners

TINY PUZZLE

Supplier: Topologika
Tel: (0733) 244682
Price: £25+VAT

Computer-based, jigsaw puzzle programs have always been a great way to develop visual discrimination and recall skills. A typical program works like this. First, a picture is loaded on screen. After a brief pause, it is split into a number of squares which are jumbled up. Then the children have to unravel them.

There were a number of such programs for the BBC B, but apart from *Jiglet* (4Mation) few have appeared for Risc OS machines. *Tiny Puzzle* follows the above formula with some interesting additional features. A useful *Big Pointer* utility is provided; this enlarges the pointer and helps young children with mouse control.



Tiny Puzzle helps young children to develop their visual skills

From the title screen the first picture is automatically loaded and scrambled into a 2x4 grid. During the program, you can alter the number of rows and columns of the grid up to a

4x4 matrix. If you get stuck you can sneak a look at the finished picture. Any picture can be printed out either partially-scrambled or complete. The program disc

contains nine colourful source pictures while the accompanying resources disc has the same in outline only, making it harder to solve. In addition, there are another 11, increasingly complex pictures, plus alphabet and number bonds.

The program also provides a useful companion to *Tiny Draw*, from Topologika, from which pictures can be imported for jumbling. *Tiny Puzzle* pictures are Mode 15 sprites which can in fact be imported from any art package. However these must be compressed using a program such as Topologika's *Create*.

Tiny Puzzle will prove a useful and enjoyable program to have. My only criticism is the lack of an overlay keyboard option. More use could also have been made of sound. Overall though, a thumbs up for home or school use.

Chris Drage

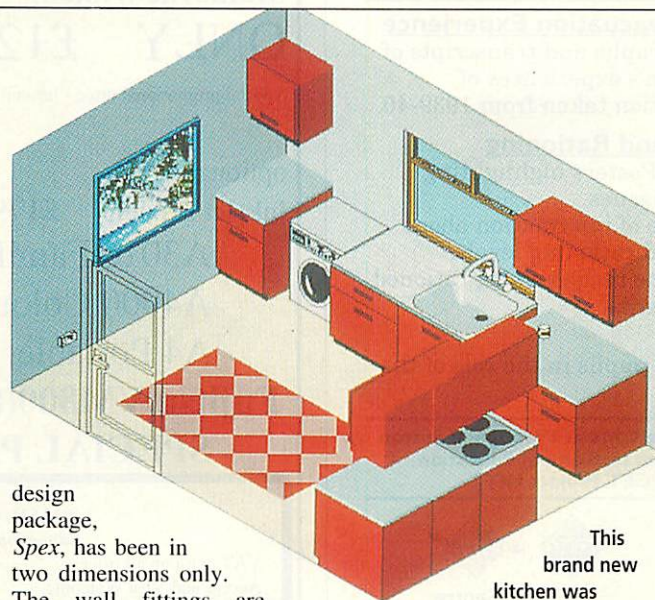
SPEX

Supplier: ExpLAN
Tel: (0822) 613868
Price: £99 including full site licence

Spex has to be the easiest way of getting into home improvements. First of course: how big is your room, please? Rectangles only, no L shapes. Now what fittings would you like? In the Wall Fittings section commonplace items like windows and doors, pictures and power sockets are simply dragged on to the wall.

Moving onto the Furnishing section allows you to place items within the room, such as tables, chairs, cookers and a few other bits and pieces such as rugs and plants, even down to a mug of tea. Again simply drag this on your plan view.

So far all the design work taken on by ExpLAN's new



design package, *Spex*, has been in two dimensions only. The wall fittings are designed on a vertical wall and the furnishing section designed on a plan view.

The magic really starts when you select View. You are almost instantly given a 3D

view of everything you have designed so far, all coloured and in the right place. The mug of tea appears on the worktop (not under it), plug

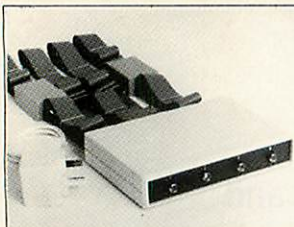
sockets are at an even height and so on. I would expect someone who is familiar with the Archimedes to be able to produce a 3D picture of a kitchen in 15 minutes from scratch. *Spex* also offers a simple spreadsheet analysis of your design, showing a full costings breakdown.

Results come quickly. This will appeal to teachers of design subjects since discussion can be about design rather than how to get the computer to work. Here is a package that can also cover some of the difficult modelling strands of the IT National Curriculum (up to about Level 6) along with more obvious strands.

Although home users may like the look of the package, I find it difficult to see how it could be used. On the other hand, in a school, *Spex* could prove to be very good value.

Bob Harding

PRINTER SWITCH-BOXES



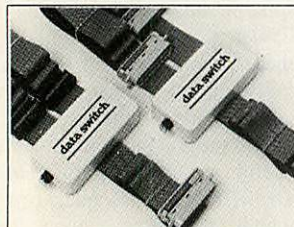
Ideal for use in schools and colleges. All versions come complete with ribbon cables, the 4-way switch boxes are fitted with 2x3.7m+2x1.7m+0.6m to the printer. Data buffers are fitted to the extra long 3.7m cables.

PS3 3-way BBC/MASTERS £59.50
PS4 4-way BBC/MASTERS £69.50
PS6 3-way A3000/IBM's £65.00
PS7 4-way A3000/IBM's £75.00



The latest addition to our 2-way range of switch boxes is the ASB2 which is fully automatic in operation and requires no power supply. All versions come complete with ribbon cables, these are 2x1.7m+1x0.4m to printer.

ASB2 2-way A3000/IBM's £39.00
PS5 2-way A3000/IBM's £32.50
PSab 2-way A3000+BBC £32.50



These compact and reliable switch boxes have a proven record of over 6 years daily use in many schools and colleges and are highly recommended. The PS2 connects two printers to one BBC, the ribbon cables are 2x1.7m+1x0.4m with appropriate connectors.

PS1 2-way BBC/MASTERS £28.50
PS2 1 BBC to 2 PRINTERS £28.50

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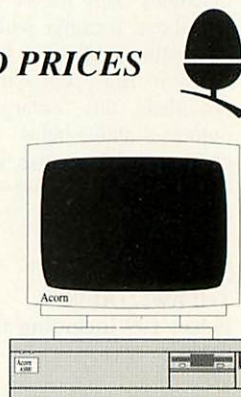
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COLOURSEP

Supplier: Ian Copestake Software

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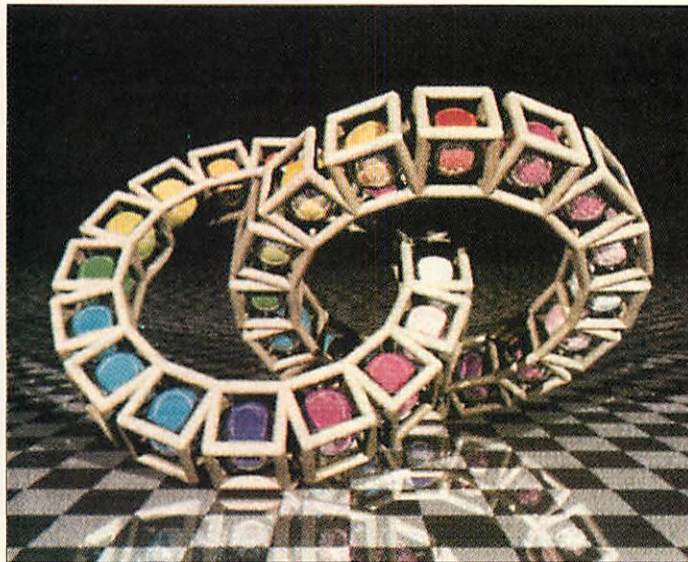
Price: Software £30, cartridges and colour inks £80

ColourSep is a multi-tasking application that breaks down colour information generated by the computer into its cyan, magenta, yellow and black components. From an unobtrusive window, colour separations can be selected; the program then effectively filters out the other components.

As with commercial printing and image setting, the four colours can be individually output and printed using a corresponding ink for each separation. But there is a problem with multipass printing on desktop printers in that the paper must be re-registered accurately enough to prevent separated prints 'drifting'.

This problem is largely alleviated by using a sheet-feeder, which is why *ColourSep* was originally targeted at HP DeskJet 500 owners. However, I decided to see whether the program could be used to good effect with my Canon BJ-10, sans sheetfeeder.

After a little experimentation, I discovered a way of re-registering the paper in the bubblejet near-perfectly, and having informed ICS of the



A colour printout using the ICS software and a BJ-10 is shown above. When compared to the BJC-800 (shown below) it is lower quality but much cheaper



method, the technique is now part of the *ColourSep* package. Colour printing requires colour inks, but neither Canon nor any other company sells colour BJ-10 cartridges. ICS, though, does offer a colour refill kit and cartridges.

Emptying the cartridges and refilling them with coloured ink is lengthy and messy, but once complete and the program calibrated for linearity of the four inks (a simple operation performed in a window) printing is straightforward.

But separating and printing four times for each document, waiting for ink to dry, refeeding the paper and changing cartridges, makes mono printing seem warp-speed.

So is it worth the wait? Most definitely. For anyone who enjoys getting a lot from very little, *ColourSep* gives BJ-10 users the opportunity to produce full-colour prints of a quality comparable to a dedicated colour ink-squitter/dot-puncher under £1500. As no two cartridges are identical, I can see the possibility of slight positional variation but you would be unlucky if this was to cause a noticeable error.

ColourSep facilitates low-cost, true-colour proofing and enables you to revolutionise DTP work. Albeit a time-consuming process, the results are excellent, given the low price of the Canon-BJ-10.

Jack Kreindler

TEXTAID 1.25

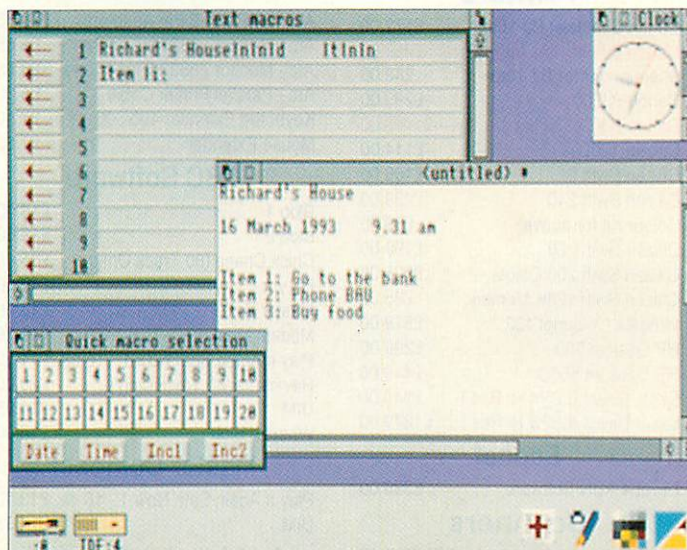
Supplier: Rheingold Enterprises

Tel: (0484) 846126

Price: £12.95 inc VAT

TextAid is an Archimedes desktop utility providing short-cuts for people using text editors. There are four distinct elements to the application: Macros, Print Control, Transfer and File Conversion.

Macros are strings of text (up to 80 characters) which you can drop into a page by selecting an icon or by pressing a function key. *TextAid* is able to store up to 20 of these. As well as the obvious uses involving ordinary text, these macros can also hold special characters that invoke other macros, insert current date and time or increment numbers.



TextAid can be put to use in some unusual ways

Print Control is similar to the Macro option, allowing you to insert strings into the text with one click of the mouse. In this

case, though, the strings are printer 'escape sequences' for bold, underline and so forth. If you happen to have an ageing

and unsupported dot-matrix printer, this could be for you. Transfer lets you paste from text icons or window bars into your current editor. This is useful for those who like to put their filenames at the end of their documents.

Finally, File Conversion can convert any Arc textfiles to and from CSV (comma separated variables) or alternatively TDA (Tab Delimited Ascii) for use in data handling.

TextAid is an easy-to-use package (although I must admit the manual could be simplified) and it will be useful for users who do a lot of work in *Edit*.

It can hardly be described as expensive and if any of its rather specialised functions appeal to you, it should be money well spent.

Richard Garrett



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GAME SHOW

Dominik Diamond was running behind schedule at the BBC Acorn User Show. The reason? A shoot-em-up called *Axis*. TV's *GamesMaster* supremo was hooked on the newest release from Power Station, on the TBA Software stand at the show in Harrogate last month. His public relations woman had to virtually drag him back to his itinerary.

So what's with *Axis*? Was Dominik just being polite or has this game got real staying power? It's a top-down view of a military base. You pilot a small tank around the grounds, blasting away bad guys such as armoured vehicles and unrepentant gun emplacements. When you control the tank, it stays still. Meanwhile, the whole landscape rotates around it with remarkable smoothness. There are plenty of power-ups to collect and the military base becomes more of a catacomb the further on in the game you get. To answer the question, tune in to next month's reviews, when we'll give *Axis* the once over.

TBA Software has another couple of games in development: a futuristic racing game called *Free Run*, where you pilot a spaceship like the land-speeders in *Star Wars*, and a *Uridium*-style shoot-em-up called *Psycho Squadron*.

Also at the show, CIS had news of forthcoming games. It has just released *Humanoids* and *Robotix* (sold as one disc, and reviewed this month) and has *Killer Bugs* ready to roll. *Killer Bugs* is similar to the *Space Invaders* genre. CIS has a version of the old arcade game *Pang* in the pipeline: you burst big red bubbles by firing spikes up into the air.

This, of course, has already been done by *Blitz*, from Arxe



Dominik Diamond played his way around the Harrogate show in April, hosting the games competition on the Acorn User stand. The game in question was *Technodream* and the winner will be revealed next month. But what did Dominik really think of the Acorn games scene? Find out in the Moxon interview on the back page this month.

Software. *Blitz* has become one of the most popular two-player games in the Acorn world since release two years ago, and has superb graphics and amusing sound effects. CIS is confident its own version, *Harry Harpoon Goes to Harpoon Land*, will be better.

CIS has also added *Chinese Patience* to its compilation pack of card games – *Card Mania* – reviewed in the March issue. CIS is on 071-226 3340. There are a couple of new budget games. *Mayhem*, from Dutch company Focos, is like the Eterna game *Tactic*. It has a playing area similar to *Tetris*, falling spheres have to land in a specified pattern to get you to the next level. Focos is at Van Beuningenstraat 40, 2582 KJ, The Hague, The Netherlands and *Mayhem* costs £10.

The other is *Switch* from Soft Rock Software in Bristol. *Switch* is a puzzle game

resembling *Connect Four*. It costs £3.49 from Soft Rock Software, Freepost (BS7 978), Westbury-on-Trym, Bristol, BS10 7BR.

Meanwhile, progress on ambitious space game *Karma* has been hit by the death of one of the authors. Rick Delarre was tragically killed in a motorcycle accident last month. Co-author Ian Robinson says he intends to continue work on the game as a tribute to Rick. The two began work on *Karma* in 1988 and a preview version was released by Periscope Software over a year ago. The main release should follow within a year.

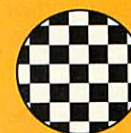
Finally, to mark the 10th anniversary of *Coin-Age*, if you buy a copy of *Paradroid 2000* direct from Coin-Age, before 10 June, you will also get a free copy of *Gribbly's Day Out*. In addition, you could win a lifetime's supply of free Coin-Age games.

CHEATS



'Shreeeech!' went Dominik Diamond's Elan as he completely totalled

his third Lotus at the Acorn User Show. Meanwhile, his opponent raced ahead on Krisalis's *Lotus 2*. Dominik burned too much rubber to win but you could do better with a little help from Anthony (surname unknown for unknown reasons) from Grantham. Try these passwords: Dark Sky, Foggy Fog, Cactus or Damp Patch. This isn't the full set because you've got to find out something yourselves.



CHEQUERED FLAG All right, don't be a lunatic Lotus abuser

then, just stick to plain old racing simulation. *Chequered Flag* will run a lot faster on an Arm 2 machine (says 'The Bear' from St Albans) if racers turn off the speed display. You know when you're going too fast anyway because you usually spin out of control and die horribly. Switching out the mirrors helps too. If you go fast enough you won't need these either – all they'll show is dust.



Oh No! More Lemmings. Oh yes, sadists. If you aren't satisfying your lust for lem-

ming blood because of a few technical difficulties (you're completely stuck) then try this one simple password instead of any others: FIDDLECODE. This takes you onto the next level every time you whack the space bar during the game. Ruthless thanks go again to The Bear.

If you think that you have even more cheats than The Bear in St Albans, don't be shy. Send them to Games Cheats at the usual address.

HEIMDALL

Supplier: Krisalis
Tel: (0709) 372290
Machine: Risc OS
Price: £29.99

The bad news. I'd like to be able to say that role-playing games were now being converted to Acorn machines in droves. Sadly, it's not true. *Heimdall* is only the second RPG to appear on the Arc. The first was *Hero Quest*.

Given the intervening Christmas consumer boom (well, more of a fizzle. Thank you Mr Lamont) this is a shocking record. Software houses please note.

Good news. While *Hero Quest* was an entry-level game, heavily redolent of its board-based roots, *Heimdall* is a regular full-sized role player with a respectable air of size and complexity. It also, refreshingly, departs from the usual sword-and-sorcery formula of elves hacking and zapping their way through endless dungeons. Instead, we have a collection of Viking types, berserkers, warriors and the like, hacking and zapping...

The scenario is that Loki, the bad guy of Norse mythology, has stolen the weapons of the gods: Thor's hammer; Odin's sword; and Frey's Spear. These are hidden somewhere on the three levels of the game which in turn correspond to the three worlds of myth: Midgard, where men dwell; Utgard, the land of

giants and Asgard, land of the gods. You have to find them.

Before you start, however, there is an cute little interlude in which you get to play three small real-time games to help determine the composition of the crew. Eminently suited to the high cultural values of Vikingdom, these have you chasing pigs, throwing axes at the braids of tethered maidens (is this politically correct?) and hopping around the deck of a longship after treasure.

Fortunately for those, like myself, with naff reflexes, you don't have to do well at these to continue with the game. Either way, you can now select the six crew members of your longship from the variety of types available.

If you did do well at the sub-games, you get a slightly wider range of personnel to choose from. Characters have the usual sort of attributes for a standard RPG: strength, dexterity, stamina, luck, experience plus 'runelore', which corresponds to the usual wisdom or intelligence and means the ability to do magic. It's highly advisable to carry a spare magic user on the ship, but *Heimdall*, the leader, who must always travel on the ship is a potent magician himself.

The game proper offers you a map of the islands of Midgard which you can use to select your destination. Some islands are out of reach in one hop and have to be reached in stages. Once you have reached one, up to three of



Heimdall: a full size respectable setting for the practice of magical arts

your crew can go ashore. Once ashore, you find yourself finally up against the real problems: the dungeons.

Dungeons are rendered in an isometric format, and you can move the character you are currently controlling around them. You can pick up objects by simply walking over them, or encounter the numerous animated characters by walking into them.

If one of the dungeon characters is a bad guy (usually the case) then you are faced with a combat screen. This shows an animation of your opponent, with a number of action icons surrounding it. By taking the opponent off-guard, which means watching their actions keenly and getting the timing right, you can do them damage, or alternatively you can block one of their blows. Magic can also be used to simply blow them away. The magic system in *Heimdall* is fairly rudimentary compared with RPGs from the *Ultima* tradition. Spells are simply scrolls found lying around the dungeons. Each can be used only once and cover options from zapping the enemy to healing your friends.

While the main puzzle component of the game is figuring out which key fits which door – the keys are distributed on islands all over the level – there are specific set pieces to solve. Usually, these take the form of figuring out a combination of switches which open a door or doors.

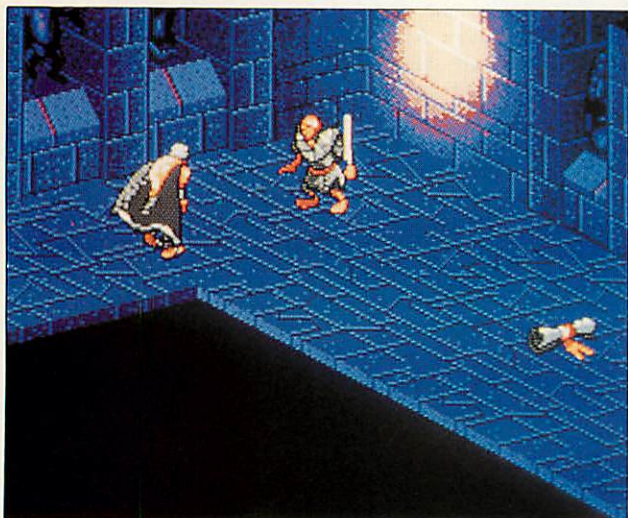
One of the very first difficulties is locating the local supermarket to spend all that lovely gold by stocking up on supplies of food and armaments: getting to my local Safeway was never like this.

And that more or less sums it up. It is a 'meat and potatoes' sort of RPG. While the scenery and characters are nicely realised, there are few frills. The magic system is fairly rudimentary, the puzzles don't tax the brain too massively (which could be seen as an advantage by hack 'n' slay fans).

The combat routines, while graphically excellent, are quirky and unintuitive: after a while they become distinctly irritating. This is not unusual, though, in RPGs; almost every effort to add a real-time combat sequence to role-playing is going to seem unsatisfactory to someone. The exception is *Legend*, on the Amiga, where the action is completely integrated with the main game.

Nevertheless, I found I played *Heimdall* straight through to the end of the first level, at which point other commitments made me stop. So it's not too fancy, but there's enough here to keep the average role-player going for a long while. The game has one other thing in its favour: on the Arc it has no competition, none whatever. Lucky for *Heimdall*, but let's hope that this state of affairs doesn't last too long.

Fin Fahey



The magic sword of Odin lies hidden within one of three worlds



ZOOL

Supplier: Gremlin Graphics
Tel: (0742) 753423
Machines: 32-bit
Price: £25.99

Good news folks. *Sonic* mania may never have made it beyond the Sega console world but now Arc players have an equally cool alternative: *Zool*.

Zool is an intergalactic ninja and a happening one at that. He is small, cute and nimble, has a smooth black shell and spiky ears. There is no knowing exactly what sort of creature Zool is, for he also has green arms and legs and a thin pair of well-tucked-away wings. But small though he may be, afraid he is not. He can smash a bumble bee just by landing on its back. He can burst a killer drum with one punch of his paw. Zool is one of those ninjas who has come to expect anything.

He wrestles wobbling jellies, ducks bows from mutant violins and laughs in the face of flying peapods (though I probably would too). To the bystander, Zool has the courage of a lion and the agility of a cat. To Zool, ninja destruction is as easy as taking candy from a baby.

Just as well, really. Zool is heading home after a hard day's ninja-ing when his spaceship comes a cropper in a strange vortex. The intergalactic ninja of the nth dimension wakes to find himself stranded on Candyland, a



As bad as Michael Jackson and a better mover too

weird planet made up entirely of sweets. His ship's computer says: 'You have been brought to this land as a challenge.' Then it says: 'Oh, by the way, the ship is damaged and will explode in seven seconds. Shutting down.' Zool exits the ship through the wall – but Candyland is waiting.

Zool is real arcade action stuff. Joystick (or keyboard) controlled, Zool runs, jumps, punches, crouches and can fire or kick at the baddies. He even skids to a halt if you try and turn him round quickly.

The little git is also a real poser. Slide him down an

icing hill and he reckons he's some kind of megastar. Leave him still for a moment and he starts doing flash ninja manoeuvres. Occasionally he gets distracted by the background music and thinks he's a born-again Michael Jackson. The best is if you fire when Zool is midway through a jump: his wings sprout out and he spins super-fast, cutting the bad guys into tiny fragments as he moves.

The game scrolls horizontally and vertically and the platforms are made of Smarties and chocolate. There are three levels per world and each world has a different theme. The fearless fighter does battle with cymbals and huge speakers in a world made of headphones, CDs and keyboards; he confronts carrots and pomegranate volcanos in the fruit world; saws, chainsaws and driller killer in the tool world; tanks in the toy world; and makes enemies with toffee apples and popcorn bags in the world of the fairground. In each, Zool must collect enough objects (sweets, CDs) to exit the stage. And, before you leave, an end-of-level baddy avails itself for a good kicking. The graphics in *Zool* are stunning

stuff and easygoing Zool will perform his mayhem to any type of music: rave, rock, funk, green – you choose. The hero's health is gauged by three red bars. When they go low, it's time to get collect some love hearts for an energy boost.

The game is easy – shoot the bad guys and collect the point-pushers to complete the levels – but there are loads of extras built-in. Apart from the usual power-up stuff (shield, super-jump, smart bomb) there are four hidden bonus levels, including a *Technodream*-style game, and crafty puzzles to solve. Look for smashable walls to find a colossal Polo mint on the first level and check the speakers that aren't speakers. One bit of advice: don't try the fast option until you know what you're doing. Even Zool gets dizzy when the world whizzes by like a video on fast forward.

Zool is Gremlin Graphics' first foray into the Acorn world and the company is on to a winner. *Zool* is cool. Get ninja-hooked today.

Sam Greenhill



Make an enemy of a grape today



FRED

Supplier: Software 42
Address: 109 Ferry Road,
 Hullbridge, Essex
Machine: 32-bit
Price: £20

Original games are a rarity these days. Companies are always boasting about the 'latest parallax scrolling' or the 'most realistic graphics' but rarely offer new ideas.

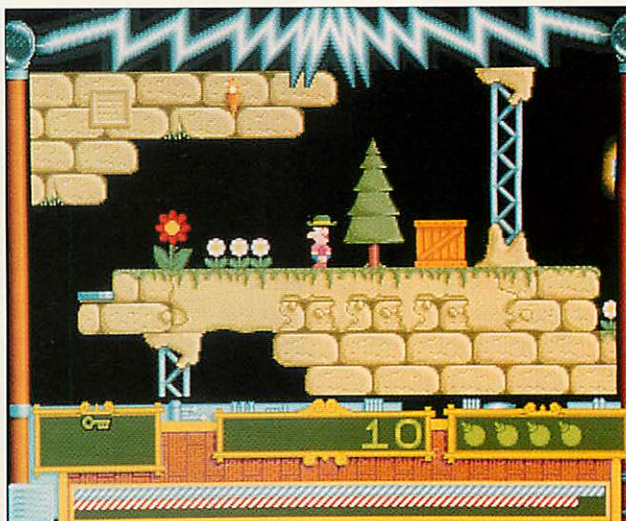
Fred is based on the tried and tested platforms and ladders theme, but is a real attempt at doing something fresh. You play the part of Malcolm Maltezer (the chocolate being) who's had the misfortune of being turned into a human being. The only way back to your former cocoa-self is by solving a series of puzzles, set over 18 levels. As with most games of this type, *Fred* features

a number of keys and bombs you must collect in order to open doors and remove

walls. What's new though, is a laser beam that must be directed to a special box. When hit, this will open a door to the next level.

When you begin a level, the laser is off and you have a fixed amount of time to run around and move the mirrors to redirect the laser beam. Some mirrors are on the ground and easy to adjust: changing them is just a case of standing over them and pressing the Alter Mirror key. Others are positioned on the ceiling and require precise timing, with a combination of nimble jumping and mirror manoeuvring.

The graphics in *Fred* are perfect for the game: bright, colourful and smooth. A number of nice touches such as flickering torches and cartoonish lollipops give the game that extra ounce of cuteness. Baddies range from Egyptian mummies to Bart Simpsons, all of which run and hop around the levels trying to stop Malcom. The



Right said Fred

game comes with a number of sound effects. Malcom's footsteps are the best, if a trifle loud for such a little guy.

At first, I was tempted to dismiss *Fred* as just another platform game, particularly as I couldn't get the hang of switching the mirrors. Once you can though, the game takes on a whole new per-

spective. The only drawback is that once you've completed all the levels, that's it. On the other hand this should take you some time, and it's worth £20 for the amount of fun that can be had.

Groovy graphics, spooky sound and chocolate; what more could you want?

Rob Miller

HUMANOIDS & ROBOTIX

Supplier: CIS
Tel: 071-226 3340
Machine: 32-bit
Price: £24.99

Cast your minds back (those of you who are old enough to remember) to the hazy days of 1983. The gentle sound of *Pong* was just beginning to fade away and was being superseded by an exciting new craze: *Defender*. Yes, a state-of-the-art arcade game on state-of-the-art Beebs.

Of course, all that has changed now, and these days with no less than 32-bits at our disposal and goodness knows how many times the processing power we're all playing... *Defender*. Hmm. Something wrong? No, just another piece of rabid nostalgia.

Humanoids is (apart from some nifty samples) a rather shameless copy of Acornsoft's *Defender*. Don't get me wrong - I'm as big a fan of the game as the next



The gaming days of yore recreated on the Arc

man. As you zoom along the horizontally-scrolling mountains, rescuing the hapless little men who are repeatedly abducted by nasty greenies, the adrenalin pumps as in days of yore. But isn't the fact that we're still zooming along a full ten years later just a little sad?

All the familiar enemies are here though. Baiters, swimmers, pods and mutants all

conspire to make life difficult, and the urgent atmosphere is as strong as ever. This is the real thing, right down to the authentically chunky explosions. As the levels go by, it becomes much harder, and the pressure mounts.

If you've never played it (and I can't believe you haven't) you're in for a treat. The same is true of *Robotix*. Here is a classic game better

known to most former Beebs-ers as *Robotron 2084* (originally by Atari) or one of its clones.

In this one a little robot has to run around avoiding other robots who are trying to close in on him. At the same time he must rescue wandering humans, avoid big dumb hulk robots, and shoot down obstacles - all this taking place at an ever increasing pace.

This is made fun to play by the fact that the robots are stupid and, if you circle them, they tend to bunch together like a herd of sheep, allowing you to blast them to tiny bits.

The Arc version has a novel touch. You control movement with the mouse, but firing is done with the cursors. *Robotix* becomes satisfyingly frantic but it was spoiled for me by graphics which look (and I mean this in the nicest possible way) as though they came from a Spectrum.

The trouble is that at £24.99 for two ideas of early eighties vintage, there's just not enough here.

Mat Tizard

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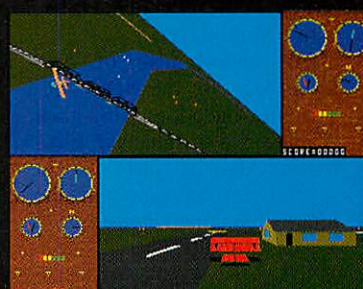
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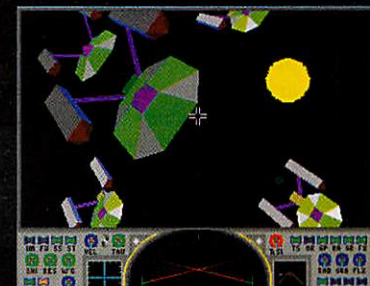
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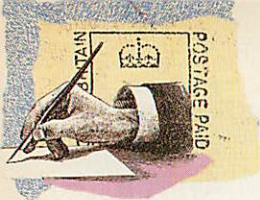
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LETTERS

£15 STAR LETTER

I have been looking through recent *Acorn User* magazines, and I notice that you seem to be recommending the use of *Translator* by John Kortink.

However, I have yet to see a mention of *ChangeFSI* by Roger Wilson at Acorn, which is supplied on the Risc OS 3 Support Disc. Although I have not seen a recent version of *Translator* (the version I have is 6.80) *ChangeFSI* seems to have a much neater front end, better processing capabilities, and, what's more, it comes free with the operating system.

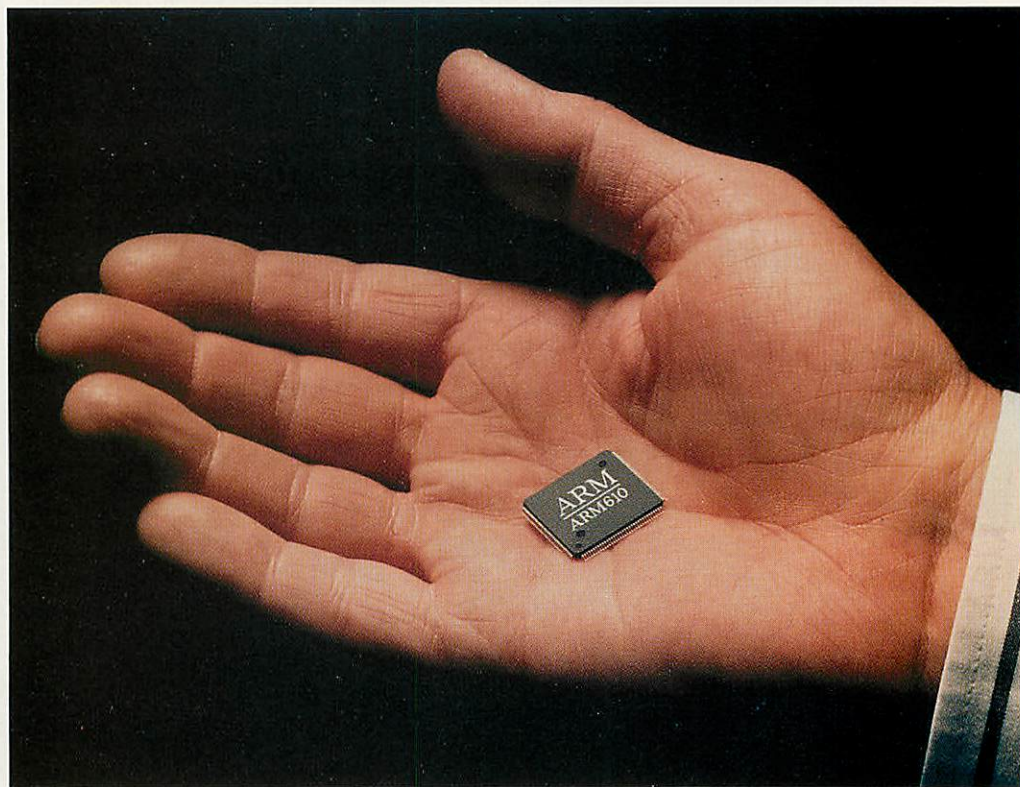
With *ChangeFSI*, it is also possible to process Windows BMP files, which answers a question posed in Questions & Answers in the February issue. Other formats recognised include JPEG, Clear, Tiff, Gif, and many other formats of which I have never heard. The only missing format from both programs (as far as I am aware) is support for X Windows bitmap files.

Also, in the November 1992 issue, you promised to review new CD-Rom discs. Judging by the adverts, there has been at least one new CD-Rom published, and yet there has been no review. I would also like to point out that there are many PC/Unix CD-Roms out there which contain C source code, perfect for all those little utilities you always wanted.

G Palmer
Aberdeenshire

We'll be taking a look at *ChangeFSI* and its image processing capabilities in an article soon. Bear in mind that *Translator* is a shareware product, so if you need to do a lot of file conversion or processing it's probably worth getting hold of both applications. One point which may be worth considering is that shareware authors do tend to take notice of bug reports and suggestions, and put out new versions constantly. A large company like Acorn can't do that quite so easily.

Our CD-Rom coverage continues on page 31 where we cover nature-based discs.



The Arm610: it may be small, but it's making it in the big time

PLAY IT AGAIN, ARM

I read with interest an article in last month's issue regarding the recently announced Interactive Multiplayer from 3DO. In the light of the recent focus on the huge revenues earned by Nintendo and Sega, the consumer games industry has attracted many would-be contenders eager for a slice of the cake – the most attractive being 3DO.

3DO has already signed up an impressive array of backers, developers and games programmers to enhance the credibility of its product. One item which the article omitted to mention is that 3DO has chosen the same Risc processor in its product as Acorn. Acorn users will be familiar with the same Arm Risc processor from Advanced Risc Machines Ltd, a variety of which, the Arm60, has been chosen as the CPU in the Interactive Multiplayer.

The endorsement of Arm technology by the 3DO consortium, including US giant AT&T, Matsushita and Electronic Arts, is just one of several developments in the international marketplace.

Within the past six weeks, Arm has signed up the Sharp Corporation as a semiconductor partner, welcomed Nippon Investment and Finance on board as a new investor, and opened an Arm Tokyo office.

This is very encouraging news from a technology developed in Acorn's R&D labs. Watch the news for Arm-powered developments.

P Magowan
Arm Ltd

Not only are programmers being wooed by the technology of the 3DO console, but the games market is taking notice.

This is potentially very good news for the Acorn market, since sharing a chip could mean that we will share the resulting software. Watch this space for more details.

DISCY BUSINESS

I have just received my latest *Acorn User* and 3.5in disc. I would like to compliment you on the very easy-to-use menu system: the disc now compares to other magazine's cover discs. It was an excellent idea

to include the help button, as it was always a nuisance to have to keep looking up the details in the magazine.

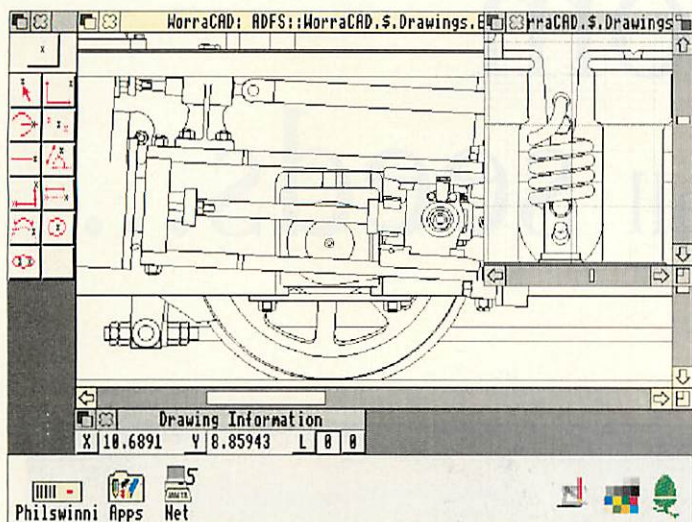
One thing that I do wonder about, though, is the amount of material on the disc. Having put the items from the magazine on the disc, there seems to be very little free space for extra items; witness the May issue, where there were no real bonuses at all. Are you going to feature bonus items regularly, or is the magazine disc simply a carrier for the yellow pages, with a souped-up front end?

R Cleves
Norfolk

With this issue of *Acorn User* we have taken a few important steps to improve our free disc even further.

From now on, each application on the disc is compressed using ArcFS 2 from Software 42, thus making the effective capacity of the disc much higher. Also, we will be concentrating on obtaining high quality bonus items, be they demos, applications, artwork and so on. If anyone has anything they think may be suitable for publication on the disc, please do send it in.

Technical Drawing for RISC OS



WorraCAD is a 2D technical drawing application for the Archimedes desktop. It has been designed to be a truly practical tool, ideally suited to dealing with the everyday problems associated with precision 2D draughting.

WorraCAD is unique amongst CAD applications for RISC OS in that it uses a floating point, rather than an integer model to represent its data internally. This avoids major problems with respect to accuracy and maximum drawing area. Highly optimised code ensures speedy performance in spite of the extra calculations required.

WorraCAD has seen many improvements over its lifetime, and most recently, has benefited from the addition of ellipses and elliptic arc geometry, and a complete revision of the user interface which is now totally icon driven (although the earlier interface is retained as an option for those who prefer it).

In spite of recent major improvements, WorraCAD's price remains at a very competitive £99.00. Education price is £69.95, and a site licence costs £279.80 (excludes p&p and VAT).

Launched in 1990, WorraCAD was the first CAD system for RISC OS.

After three years of continual refinement, the application has matured into a product essential to anyone creating technical drawings on the Archimedes.



WorraCAD can output files in a wide variety of formats. Drawfiles can be transferred to almost all other Archimedes graphics packages. DXF and HPGL files cater for industry standards.



Technical drawings require the use of different linestyles to show hidden detail, centre lines and so on. WorraCAD provides a range of styles to cover virtually all requirements.



The greatest strength of WorraCAD is its ability to calculate tricky geometric constructions automatically. Tangents, normals, foci and so on can be generated simply by clicking the mouse.



One of the most time consuming tasks at the drawing board is that of hatching. With WorraCAD, you simply select the boundary and any islands to be hatched, click, and the job's done.



WorraCAD allows virtually unlimited scope for zooming in and out. Because of WorraCAD's unrivalled accuracy, even at 500 000 x magnification, the drawing still hangs together.



The grid system in WorraCAD can be set to display in either orthogonal or isometric modes. The vertical and horizontal spacing can be independently adjusted.



Comprehensive dimensioning to BS308 is provided. Dimensions are associative - if the drawing is stretched, the dimension adjusts automatically. Precision and dimension style are easily controlled.



Plotter output is provided using the HPGL format, the industry standard plotter control language. Output can be sent directly to the plotter, or to file for plotting later, perhaps via a bureau.



Printer output goes via the standard RISC OS printer drivers. A preview mode is available, and a monochrome option is provided for output of coloured drawings to monochrome printers.

Move up to WorraCAD and draw your own conclusions



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HANDS ON

**Practical advice and techniques
for your machine**

THIS MONTH:

- **A complete rendering program**
- **Questions and answers**
- **3D programming**
- **Star Info**
- **Hints and tips**
- **Assembly language round-up**
- **Program listings**



HANDS ON

Hello, good evening and welcome to the new Hands On section. This part of the magazine is dedicated to all those who want to understand more about their machine, and want to know why things happen the way they do. Programs, hints and tips, *INFO, Questions & Answers: they're all in here.

This month kicks off with a complete rendering package which can produce some truly spectacular results. The code is so long we can't list it in the magazine, but if you need one good reason to get the subscribers' disc, this is it. Take a look at the examples on this page; they're all produced by describing a scene in a simple script language, and letting *Render* do the hard work.

Continuing with the theme of graphics, Dave Acton presents the first part of a series on displaying 3D scenes. These articles will provide programs and tools to enable you to build up 3D objects and worlds, and will even allow you to make 3D animations.

Yet another new section is Hints and Tips, your indispensable guide to a better computing life. This is where you get the chance to share those vital titbits of information which make using the Arc that little bit smoother. If you've got anything you'd like to share with the rest of the world, drop us a line.

As if all this wasn't enough, Questions & Answers aims to solve all your problems and more, and *INFO continues to prove there's more to life than 9 to 5.

So go on, get stuck in and get your hands dirty.

Mark Moxon
Technical Editor

GRAPHICS RENDERED SIMPLE

Rendering is a vital aid to producing lifelike graphics.
Robin Barnes shows how you can achieve amazing results
without time-consuming ray tracing

It seems computer programming, like everything else, has fashions. A few years ago no respectable computer was without a suite of Mandelbrot generators; since then Cellular Automata have grown and died.

Recently, with full-colour, high-resolution graphics becoming commonplace, interest has grown in rendering algorithms.

A rendering algorithm constructs a realistic picture from simple data describing the nature of the scene. The most common algorithm is the ray tracer, which laboriously traces each light ray back from the observer.

Although the results are very good, the amount of processing involved is prohibitive; a single frame can take many hours to produce. For most images ray tracing isn't needed; most computer graphics research is devoted to finding simple, fast algorithms that can fool the eye into believing the image is real.

Render is just such a program. It takes a scene described by its own language and produces a sprite in a fraction of the time a ray tracer would require. On average, a single frame

containing several thousand polygons is produced in twenty minutes. *Render* can cope with multiple light sources and multiple material descriptions. It incorporates Phong shading for curved surfaces and can texture map sprites over groups of polygons.

The main routines for rendering are written in machine code and use single precision floating point arithmetic throughout. The program is split in two: a compiler that translates a scene into raw data, and a renderer that produces the output sprite.

The scene is described by a textfile written in the script language; this is reduced by the compiler to a list of points and polygons that can be manipulated much faster by the machine code. The renderer produces 256-colour sprites and uses a colour stippling routine to extend the apparent palette.

Because the programs are too long to be listed here, *Render* is supplied on the subscriber's disc. If you do not subscribe, you can

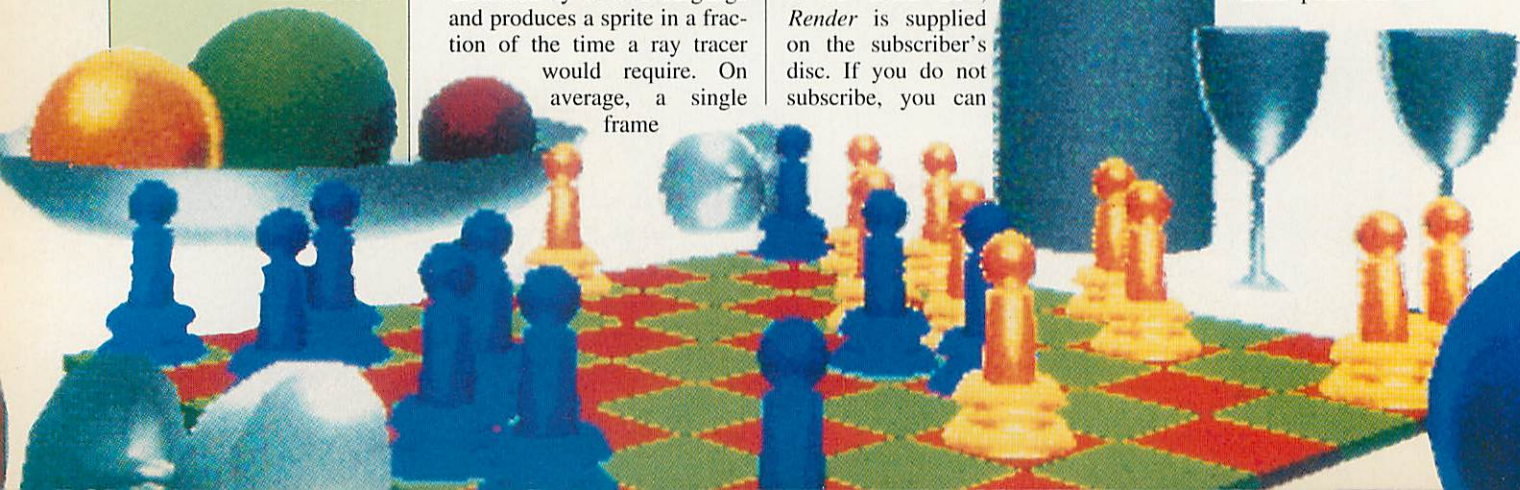
still get the disc: see page 73 for details. Full instructions on how to use the application are on the disc.

THE ALGORITHM

A rendering algorithm must convert a set of three-dimensional points and polygons into a two-dimensional image. To do this the routine must calculate which polygons are obscured by others closer to the observer. It must also calculate the colouring of those that are in view.

A number of standard methods have been developed over the years, the most powerful being the scan line technique. This involves scanning across each of the lines of the screen to find the intersections of that line with polygons.

Render uses a derivative of this algorithm known as the spanning scan line. A list is constructed for each scan line containing the intersections of all the polygons with it. Each point on the



line is then checked against this list to discover which polygons it lies within. The relative depths of the intersected polygons are then compared, to find the one closest to the observer.

Having found the polygon in view and the position of the point within it, it only remains to find its colour. This is done using an illumination model applying the laws of optics. The model calculates the intensity and colour of the point using the incident light and the material properties of its surface.

Render uses a very simple model. White light from an infinite distance strikes the surface of the material. Some is absorbed, then re-emitted as randomly-scattered light in a process known as diffuse reflection. The remainder is reflected at the surface by specular reflection.

The intensity of this diffuse reflection is determined by the angle at which the light strikes a polygon, measured relative to the normal or perpendicular to the surface. The intensity of specular light is determined by the angle between the light reflected from the surface and the line of sight of the observer.

This simple model can only cope with a flat surface whose normal is constant at all points across it. A curved surface, by its very nature, has a normal that will continuously change in direction.

Render incorporates a solution to this problem, available to scan line algorithms, called Phong shading. As the position within the polygon is already known, and assuming the normals at vertices can be found, it is possible to interpolate between them to find the normal at any point. The resultant difference to the final rendering is quite striking.

Render uses a number of separate machine code routines to perform all the necessary calculations. A number of preliminary calculations are first performed to speed up the final rendering.

The points are transformed according to the view point of the observer, the plane equations for the polygons are calculated and from these the normals

at all points can be derived. Finally, perspective is applied and the boundaries of the polygons are found.

The scan conversion can now take place; a list of intersections is formed at the start of each scan line and every point along the line is tested in turn. Information is then returned about which polygon is in view; the interpolated normal (if the polygon is curved); where the polygon was intersected; and which points within it border the intersection.

The normal is then fed to the illumination model, which returns the red, green and blue intensity of the light. This is converted to the 256-colour palette by scaling to 24-bit and subsequently to eight-bit colour. Finally, a small error is applied to give the appearance of there being more colours on the screen.

CONCLUSIONS

The program started out as a comparatively simple idea for a rendering algorithm and has since snowballed into a major project. Along the way, the script language has, to an extent, become the more important result.

The rendering algorithm still has some room for improvement: the lighting model is, for example, rather simple and does not include point light sources or shadows, and the reflection model is also rather primitive.

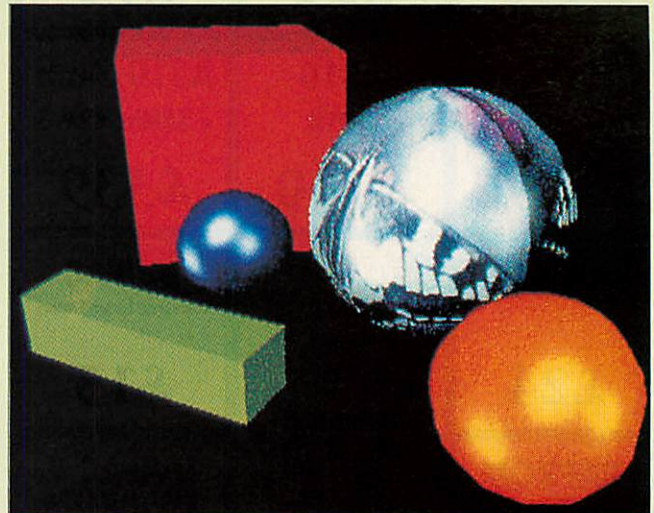
The language and the compiler, however, could be coupled to a more powerful algorithm, such as a ray tracer. You could then use it to form the basis of a powerful graphics tool. Despite the limitations, I am sure you will find the final results worth the effort.

REFERENCES

Some useful background reading on the subject can be found in *Procedural Elements for Computer Graphics* by David F Rogers.

For those who would like to become more involved in ray tracing and rendering, and want to try a professional application, check out *Illusionist* and *Render Bender*. These are both available from Clares, telephone (0606) 48511.

THE SPRITE LANGUAGE



Scenes are described in a script language, designed to be as flexible as possible without being unnecessarily complicated. There are no line numbers, variables or control structures, and few commands. Despite this, complicated images can be generated by comparatively simple programs or scripts.

An example script is shown below, and the scene it describes is above. The sections of script are easy to follow. First the materials to be used are defined. Then comes the longest definition, that of a sphere, then the cube definition.

The scene itself is then described. This consists of a sphere with a sprite mapped onto it, then a red cube, a green cube, a gold sphere and a plastic sphere. All that remains is to describe the resolution and filename of the output, and to define the positions of the observer and the light source. You will find full instructions on the disc.

```
material { 0,0,0.2 0.8,0.8,0.8 10
red 0.4,0,0 0.6,0,0 4
green 0,0.4,0 0,0.6,0 4
gold 0.8,0.1,0 0.6,0.4,0.1 10
}

define (shape { 12 0,COS(PI*1/11),0 -SIN(PI*1/11),0,0 0,0,-SIN(PI*1/11))
shape { 12 0,COS(PI*2/11),0 -SIN(PI*2/11),0,0 0,0,-SIN(PI*2/11))
shape { 12 0,COS(PI*3/11),0 -SIN(PI*3/11),0,0 0,0,-SIN(PI*3/11))
shape { 12 0,COS(PI*4/11),0 -SIN(PI*4/11),0,0 0,0,-SIN(PI*4/11))
shape { 12 0,COS(PI*5/11),0 -SIN(PI*5/11),0,0 0,0,-SIN(PI*5/11))
shape { 12 0,COS(PI*6/11),0 -SIN(PI*6/11),0,0 0,0,-SIN(PI*6/11))
shape { 12 0,COS(PI*7/11),0 -SIN(PI*7/11),0,0 0,0,-SIN(PI*7/11))
shape { 12 0,COS(PI*8/11),0 -SIN(PI*8/11),0,0 0,0,-SIN(PI*8/11))
shape { 12 0,COS(PI*9/11),0 -SIN(PI*9/11),0,0 0,0,-SIN(PI*9/11))
shape { 12 0,COS(PI*10/11),0 -SIN(PI*10/11),0,0 0,0,-SIN(PI*10/11))

point { 0,1,0
point { 0,-1,0

surface { 0 12,10 TRUE,FALSE}
link { 0,11,120} link { 11,10,120} link { 10,9,120}
link { 9,8,120} link { 8,7,120} link { 7,6,120}
link { 6,5,120} link { 5,4,120} link { 4,3,120}
link { 3,2,120} link { 2,1,120} link { 1,0,120}

link { 108,109,121} link { 109,110,121} link { 110,111,121}
link { 111,112,121} link { 112,113,121} link { 113,114,121}
link { 114,115,121} link { 115,116,121} link { 116,117,121}
link { 117,118,121} link { 118,119,121} link { 119,120,121}
}

define (point { -1,1,-1 1,1,-1 1,-1,-1 -1,-1,-1
-1,1,1 1,1,1 1,-1,1 -1,-1,1

link { 0,1,2,3} link { 1,5,6,2} link { 5,4,7,6}
link { 4,0,3,7} link { 4,5,1,0} link { 6,7,3,2}
}

sphere { 0,1,0
texture { 0,4,0,6,15

fit { 12,10
map { 0,5,1
map { 0,5,0
}

}

cube { -3,1,0.25 red rotate { 0,60,0 }
cube { -1,0.25,-2 green scale { 1,0.25,0.25 } rotate { 0,20,0 }
sphere { 1.5,0.6,-1 gold scale { 0.6,0.6,0.6 }
sphere { -1.5,0.5,-0.8 plastic scale { 0.5,0.5,0.5 }

display { 1024,1024 medium 1280,1024}

view { 3,3,-4 25,-45,0}

light { 160,40 210,-20 140,60 90,20}
```


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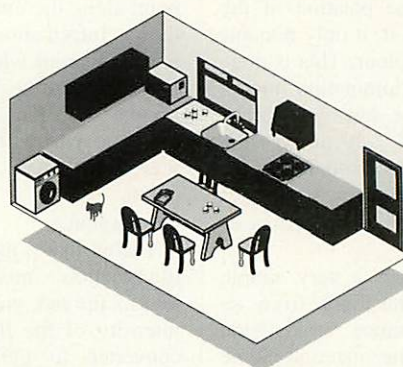
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QUESTIONS AND ANSWERS

Q I have a 4Mb Archimedes 310 which I use with Clares *Rhapsody* for Midi music. Recently, I was given an MS-Dos demo disc containing Midi files that I wanted to use on my computer. I copied these across to an Archimedes disc using *MultiFS*, but when I tried to load them into *Rhapsody*, I got a message saying 'Rhapsody, Midi or Maestro files only please' and could get no further. Have I got the wrong sort of Midi file, or am I doing something wrong?

M Connolly
Norwich

A It's true that Standard Midi Files (SMFs) do come in three types (0, 1 and 2) but the vast majority of commercial songfiles are of type one and therefore compatible with *Rhapsody*. My guess is that the file you are trying to load still has its filetype set to Dos, as opposed to Midi, and this is what prevents *Rhapsody* from loading it.

To fix this, press F12 for the command line and if, for example, your SMF is called Fred/Mid, type *SETTYPE FRED/MID FD4 and press RETURN. This changes the filetype to the hexadecimal number FD4 denoting a type one Midi file.

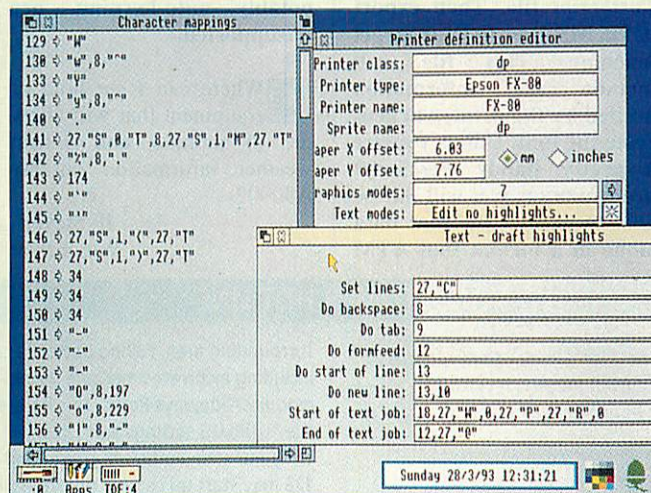
If *Rhapsody* is already installed, the file icon will change from the MultiFS Dos image to a Midi icon. Once this has happened, you can drag the file into *Rhapsody* and it should start to load. Standard Midi files take some time to convert, so it's probably worth saving a new version in *Rhapsody* format as soon as loading is complete.

Q I bought a BBC Micro-computer several years ago which my family have used more as a games machine than anything else. Recently, I have been using a personal computer at work and am now interested in using my micro for business both as a word processor and a spreadsheet. Is it possible to update my computer and, if so, what will I need to buy? Would I be better off starting from scratch?

STAR QUESTION

Q I have an A3000 with Risc OS 3.1 and a Panasonic KX-P1180 (Epson FX-compatible) printer. When I had Risc OS 2, I often sent control codes to my printer within *Edit* documents using the printer driver PrinterDM. Since I upgraded to Risc OS 3.1, the new printer driver does not appear to recognise these codes despite my experiments with different configurations. To overcome this, I've fallen back on printing such documents using the old printer driver. I would appreciate any advice.

J Tarrant
Bucks



PrintEdit is one way to deal with escape sequences

A Try this. Call up a bit image printer configuration window by selecting your printer in the Print Manager, then choosing Configure from the menu. If the text quality option is set to no highlights and the control codes option says standard, your files should print as they did under Risc OS2.

Alternatively, you could use *PrintEdit*, shown above, to map some of your escape sequences to characters with high Ascii values. This effectively creates single highlight characters which are then expanded into control codes at print time.

Naturally, I want to end up with a reasonably-equipped system but cost is also a consideration. My computer is a BBC B with a cassette player and a black-and-white monitor.

J Dunn
Ipswich

A Yes, this is possible. You'll need a word processor and a spreadsheet

program on Rom chips; these will plug easily into your computer. You could have a look at Computer Concepts' *Inter-Word* and *Inter-Sheet* or Acorn's *View* and *ViewSheet* packages. These cost between £70 and £80 excluding VAT and will meet your basic needs but it is unlikely that you will be comfortable with them alone. The slow speed of a cassette

is just about acceptable when you want to load one game and play solidly for two hours. However this storage speed becomes very tedious when it comes to saving word processor documents every 15 minutes.

To make the setup usable you will also need to invest in a 5.25in disc drive (minimum £70 plus VAT) and the DFS kit that upgrades your Beeb to talk to it (about £45 plus VAT). Once you throw in a cheap dot matrix printer you're looking at about £350.

If your home office needs are fairly modest this setup may be sufficient. However, if the personal computers you use at work are PCs, equipped with serious business software, you'll probably be unimpressed by the results. With the best will in the world, a BBC Micro will never offer the facilities available in *WordPerfect*, *Word for Windows*, *Excel* or *Lotus 1-2-3*. However a Risc based Acorn machine certainly can.

My advice is to find someone in your area who can show you a BBC B running the software I've suggested and, if it doesn't meet your needs, put your £350 towards an A3020 *Learning Curve* or even an A4000 *Home Office*. Both packages come with a word processor and can write to MS-Dos discs so you might forestall the purchase of a printer by taking Ascii and CSV files into work and printing them there.

Q Having typed in the six *Bio* programs in the February issue of *Acorn User*, I experienced difficulty with *Bio1* starting at line 1690. Is there a means by which I can move through a Basic program on my A540, a step at a time?

B Boswell
Radlett

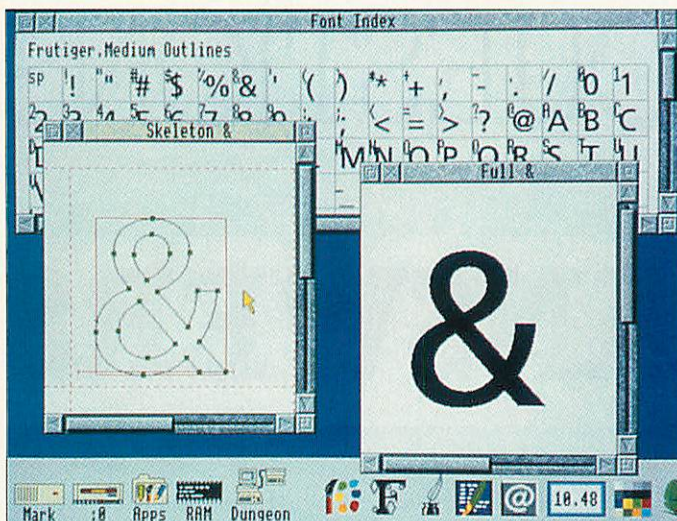
A This is called line tracing. You need the Basic keyword TRACE. The two options you're most likely to want are TRACE ON and TRACE STEP ON. TRACE ON causes Basic to print every line number it meets as it

interprets the program. TRACE STEP ON does the same, but pauses for a key-press between lines. When you've debugged the program, TRACE OFF deactivates either function.

Q I recently upgraded my A440/1 to Risc OS 3 and am very pleased with the new operating system. On the support disc which came with it, there is an application for converting Adobe Type Manager (ATM) outline fonts from a PC to Risc OS format. I have several hundred Risc OS fonts which I would like to convert to ATM. Is there any way I can do this using TIToFont and, if not, what software do I need? Also, is there a version of FontEd for Risc OS 3 and how could I obtain a copy?

C Archer
Bangor, Co. Down

A As far as I know, the only programs to convert Risc OS fonts to Type 1 PostScript are in-house utilities written by font manufacturers and are not available either commercially or in the public domain. If you need to print documents containing



FontEd is Acorn's specialised editor for fonts

Risc OS fonts to a PostScript printer connected to a PC or a Macintosh, the following is one option.

First print your *Impression* document, or whatever, to a PostScript file. Then export it, via MS-Dos, to your target machine. This file will include the information needed by the printer to generate the font. Unless you are a pretty handy PostScript programmer, you will not be able to extract the font data alone in a format that ATM

will recognise. You can get the current version of FontED from Acorn, on (0223) 254254. At time of writing, though, some elements of Risc OS 3 fonts, notably auto-kerning, are unsupported.

Q Where can I get hold of equipment that will allow me to monitor and collect weather information on my A3000?

JF Stevens
Winchester

A If you want an automatic weather station that records things like sunlight, humidity, windspeed, rainfall and so on, have a look at *The Weather Reporter* made by AU Enterprises on (0707) 266714. If, on the other hand, you're interested in satellite data systems, talk to Spacetech on (0305) 822753.

Q I own an Archimedes and would like to purchase a copy of Tetris to play on it. I have heard that there are versions available in the public domain. Please can you tell me which public domain houses sell it?

M Turner
Thirsk, North Yorkshire

A There are numerous Tetris-type programs in public domain and opinions differ as to which is the best.

This being the case, Arch Angel PD, PO Box 41, Exeter, EX4 3EN has put together a mini-compilation of the best seven versions, all compressed onto one disc under ArcFS. A copy will cost you the princely sum of £2.00.

CUSTOMER HOT LINE



Each month in Acorn User, Alan Glover offers you the latest support and advice from the Acorn customer service department.

COMPUTERS WITH AMNESIA?

All Acorn computers since the Master 128 have relied upon configuration settings which are stored in a memory device that has a constant power supply, even when the computer is switched off. This is usually, though incorrectly, referred to as Cmos Ram.

With the exception of the Master Compact, the power to maintain the settings (and the real-time clock) comes from batteries inside the computer. The Master Compact used a device called an EEPROM (an Electrically Erasable Programmable Read-Only Memory) which did not need a battery, but only allowed a limited number of write operations. Where a Master Compact is failing to retain its settings this device may need replacing.

On most Arm-based 32-bit systems the battery is a NiCad (Nickel Cadmium) cell, which is trickle-charged while the computer is switched on. This means that, after a machine has been left unused for a long period, it may need to be left on for several hours to recharge the battery. These batteries should not need replacing.

The Master 128, Archimedes 305/310, Archimedes 440 and Archimedes 400/1 series all use a battery pack with conventional battery cells. The recommended replacement interval for these batteries is annually, however they will often work for much longer. Even now, it is not uncommon to see a 305/310 still on its original pair of batteries.

As with all devices powered by batteries you should replace them at recommended intervals, and avoid leaving discharged batteries in place since corrosive substances may leak from the battery and damage the

surrounding area. Failing batteries can produce many strange symptoms, including incorrect time/date values and the random disabling of modules/sideways Roms. This happens when the locations used to hold the *UNPLUG settings vary, because the battery can no longer consistently maintain sufficient power and can cause some odd errors: a Master 128 may start up using a different filing system to normal, or a Risc OS computer may fail to start up the desktop.

It could be time to think back and ask yourself, when were your batteries last changed?

ETHERNET-BASED AUN NETWORKS

If you are getting poor performance from an AUN network you should check whether the Broadcast Loader is enabled on any Ethernet-based stations. The Broadcast Loader should be disabled in these circumstances using *Unplug BroadcastLoader in a boot sequence.

FREE LOADER

The filetype system employed in Risc OS can be used to save memory and automatically load specific applications as required.

You do not, for example, have to have *Edit* loaded at all times to be able to double-click on a text file. Ensure that *Edit* has been seen in a directory viewer before you double-click on a file which can be handled by that application. That way, the application will be loaded when it is needed. There are some side effects: if a file does not have its usual icon, but has a blank square instead, the application has not been located yet in a directory viewer.

There are also some filetypes allocated to generic files, such as CSV (comma separated value), often used for interchanging data between applications. Because these are general files, they should not be specifically claimed by any particular application.

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Out 00:00:00:00

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A NEW DIMENSION

You don't see the real world in two dimensions, so why settle for it on your screen? Dave Acton talks you through part one of our 3D tutorial

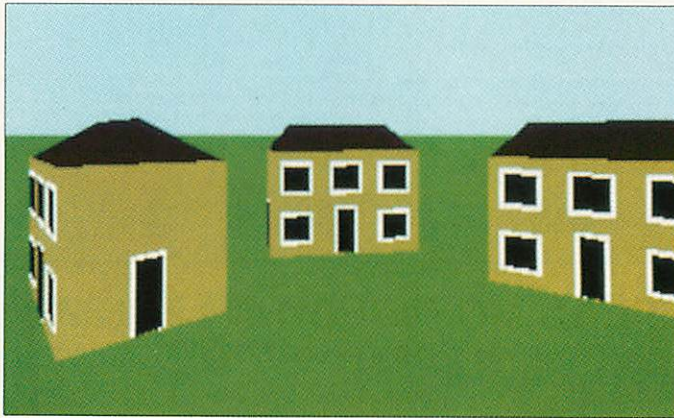
The challenge of turning a flat monitor screen into a window on a three-dimensional world has fascinated programmers for years. Whether you're designing a new car, learning how to land an Airbus or simply trying to shoot a few aliens, having that extra dimension makes all the difference.

This series is all about 3D graphics on your Acorn 32-bit machine. We'll kick off with a Basic demo to tickle your fancy and show how simple the idea is. The demo is on the monthly disc and in the yellow pages. Over the next months we'll provide a module for faster 3D graphics, a designer for 3D objects and worlds and finish with 3D animation.

FUNDAMENTALS

The idea behind 3D graphics is simple. Just as points on a flat screen have two co-ordinates (x and y) points in the 3D world have three (x , y and z). An object's z co-ordinate can be thought of as how far it is *into* the screen. In the real world, it's just the distance an object is from your eye when you're looking straight at it.

Because a monitor is 2D, not 3D, we need to convert 3D co-ordinates into 2D ones before we can display them. We could simply ignore the z co-ordinate, but the effect would be very unrealistic. We need to take account of perspective. Put simply, this is the property that makes objects appear smaller the further they are from the



The program lets you see the houses in 3D and move around them 360°

eye. The perspective transformation is the process by which 3D co-ordinates are converted into 2D ones. These represent, as realistically as possible, the 3D world on your flat screen.

SENSE OF PERSPECTIVE

Many 3D textbooks are filled with line drawings to explain the idea of the perspective transformation but, because books are no more 3D in their nature than screens, such diagrams often confuse more than clarify. Best then, I think, to picture in your mind what is going on.

Imagine standing in front of a house. In fact, go outside and have a look at your own. Imagine you can see through it. The rear wall – although its x and y dimensions are the same as the front wall – appears much smaller than the front wall. Its z co-ordinate is bigger.

Therefore, if you were to attempt to draw your house on the screen it would make sense to divide the x and y co-ordinates of each wall by their z co-ordinate in some way.

In this way, the further away something is, the bigger the z co-ordinate and the more the object would be scaled down. This is all there is to the perspective transformation. The x and y co-ordinates of an object are divided by their z co-ordinate and multiplied by some suitable scaling factor so they fit comfortably on the screen.

At this point it is as well to remember that 3D vision is somewhat arbitrary. That is, despite all the diagrams and formulae you may come across in weighty tomes, the way we

see the

world in 3D is peculiar to humans. Fish and birds see a different picture, and as for flies – well, I'd hate to write a CAD package for flies to use.

We don't see a nice rectangular section of the world – things in front of us are sharper than those at the side – and our brains sort out all the information, so we get an apparently seamless view.

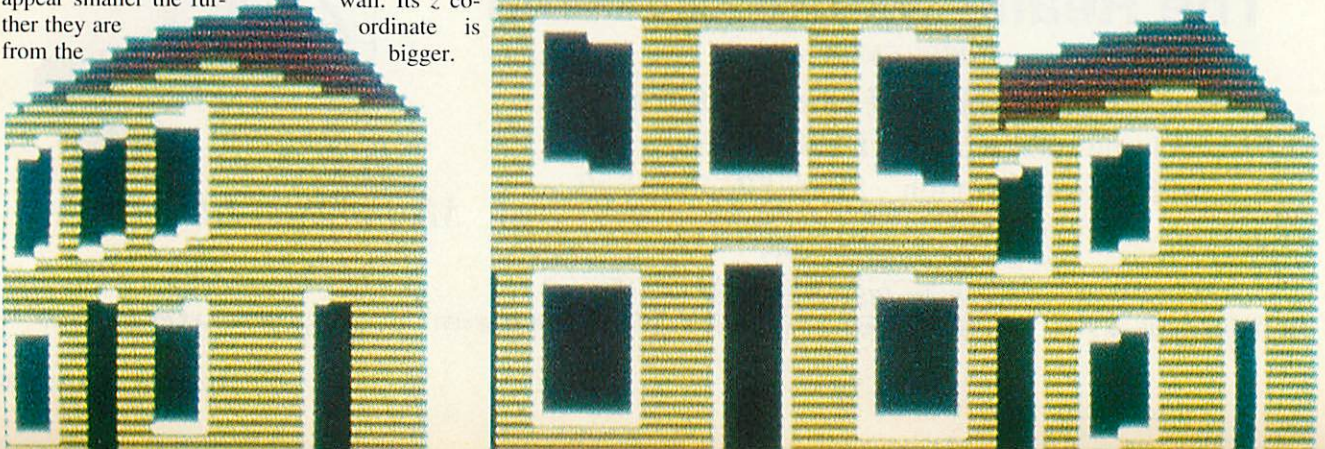
Therefore, whatever we do, we will never manage to fully convince someone that what is behind the monitor is actually real. All we can hope for is to give the best approximation of reality we can.

IMAGINARY WORLDS

Having found a good representation of the 3D world, we now have to consider how our imaginary world is to be defined and stored. The practicalities of managing an imaginary world throw up many problems.

The real world is made up of countless objects – imagine how long it would take to plot a field of grass on the screen if each blade had to be considered individually. In defining our world, we therefore have to keep three points in mind at all times:

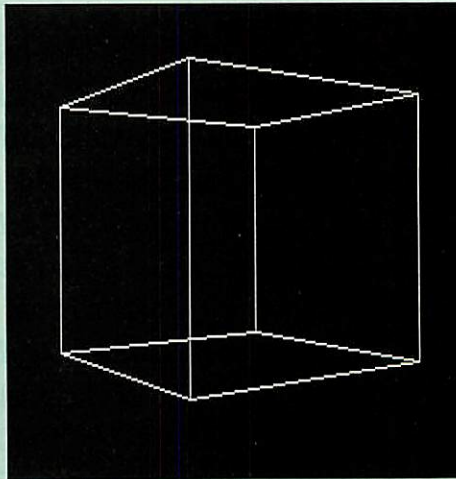
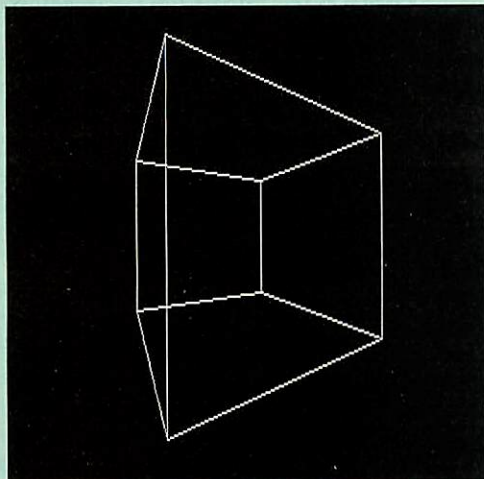
- 1 Ensure that the total number of objects is kept to a minimum.
- 2 Keep object definitions simple enough so the available processing power can cope with them.
- 3 Discount invisible objects,



PUT THINGS IN PERSPECTIVE

The short program *PerspDemo* illustrates how perspective can be made 'wild' or 'tame'; the choice depends on the type of program you are writing. Two factors in the program are changeable: *d* and *zoff*. The *d* factor is simply the scaling factor we talked about earlier on. Meanwhile, *zoff* is an offset in the *z* direction and represents how far back you are standing to view your 3D world.

Run *PerspDemo* and move the mouse left or right to change the value of *d*; up and down to alter *zoff*. Now move the mouse towards the left and then up or down until the rotating cube is clearly visible. Here the perspective is exaggerated. It's just like looking through a fish-eye lens from close-up. Now move the mouse to the right and then up or down again until the cube fits comfortably on the screen. The perspective here is much toned down. We have put down our fish-eye lens, taken a good few steps back and are now looking at the cube through binoculars. As you can see, by altering just these two values, a great variety of 3D images can be produced and it is really up to you to tweak the numbers to best suit your application.



such as those 'behind' us, as early as possible.

BUILDING BLOCKS

Consider the problem of defining and displaying an imaginary street. You could break the whole street down into triangles (bits of roof, wall, window and pavement). This would give you thousands, possibly millions, of these little triangles.

Then you could plot these, rearmost first, to give the picture. This would work, but would take a great deal of effort both to set up the data and process it.

Better by far to use an object-oriented approach. You might tackle the problem thus. First, define a window; then define a door; define a blank wall and add windows and doors to it; define a house as four walls plus a roof; define a pavement and a road; finally, define a street as a set of houses ranged around a pavement and road.

By defining simple objects and using them as building blocks to create more complicated ones we both simplify the definition stage and make life easier when it comes to plotting the scene. If a house is

invisible to us, we shouldn't worry about each pane of glass in its windows, but should discount it immediately. The building block technique makes it easier to ignore irrelevant parts of the scene.

A DEMONSTRATION

And so to our short demonstration, which you will find in the yellow pages. There are, in fact, two demonstrations: *3Ddemo1* and the slightly faster *3Ddemo2*. These build up into a short sequence of frames (36 in all) which are played back repeatedly. You are then taken on a flight around the group of houses.

Both demos require the Basic library *3Dprocs*. The definitions for our 3D world take the form of two text files, *House* and *World1*, which should be entered using *Edit* and saved in a subdirectory called *Objects*. The format of the files should be fairly obvious. Special keywords are used in the definition of objects:

rem introduces a comment.

colour defines the colour of the following surface (red, green and blue).

object begins the definition of a new object. The special

object 'world' must be present and this is the one that the demonstration shows.

surface introduces a new surface. A surface is simply a list of three or more points, defined with *x*, *y* and *z* co-ordinates. For example, a door is made up of a black rectangle on top of a white one.

include is used to include a named definition file at that point. The file *World1* includes the file *House* and then defines the object world as three houses.

xxx includes object *xxx* in a definition. So a wall contains windows and a door. The object name is followed by six numbers: *x*, *y* and *z* co-ordinates which define where the sub-object is in relation to the parent object and three angles which define how far the sub-object is rotated about the *x*, *y* and *z* axes. In these demos only the second angle is used.

SORTING

The 3D world is displayed using the following steps:

1 Each object is examined, and the 3D co-ordinates converted to 2D ones.

2 The 2D representation is stored as a set of triangles.

3 The average *z* co-ordinates of the triangles are also stored.

4 The triangles are sorted according to the average *z* co-ordinates.

5 Starting with the rearmost triangle, the world is now plotted. (In fact, the scene is stored as PLOT commands to be played back at the end.)

The Merge keyword is used in some of our definitions, to avoid problems with sorting. For example, doors are merged onto walls so that they are always plotted after the wall itself.

Otherwise the wall and door would be treated separately and occasionally the door might be pushed behind the wall.

SORTING AND CLIPPING

As we mentioned before, one of our main objectives is to keep the number of objects and calculations to a minimum. Rather than work out which triangles obscure which others, we plot from the back forward.

Using the average *z* co-ordinates to sort by is sufficient for this simple example, but a more complex comparison is needed if the objects in the world overlap more subtly. The object-oriented approach also helps here. If one house is behind another we do not need to compare individual features like windows. We plot the rear house, then the front one – this means you have to deal with fewer comparisons, so you get faster graphics.

Clipping is an important way of reducing workload. The picture of the houses shows the section of the 3D world we see. It takes the form of a square-based pyramid, extending through the screen into the imaginary world. The pyramid base is the monitor screen, the apex is your eye. Clipping involves discounting invisible objects and is done in two stages.

First, all objects outside the 'view volume' are ignored. This includes those wholly to the left, right, above or below the pyramid, those behind us and those too far away to see. Those not discounted are displayed, but any parts off-screen are clipped by the operating system. When we write display routines, we do this 2D clipping ourselves.

3Ddemo2 uses another time-saver. If an object has no holes in it, any faces that point away from us must be obscured, so needn't be considered. *3Ddemo2* uses this to reduce the number of triangles plotted and speed up the display.



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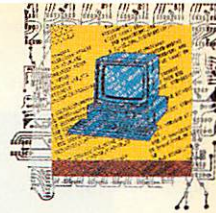
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*INFO

The two Daves get into
moving windows, distorting butterflies
and a new Life competition



IT'S A WRAP

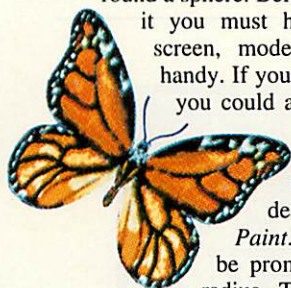
Program: Distort
Description: Graphics distortion demo
Author: David Jeffries
Machine: 32-bit

This program was originally to animate a rotating globe. It takes any mode 15 screen picture and, by default, wraps it round a sphere. Before running it you must have a full screen, mode 15 sprite handy. If you have none, you could always grab a snapshot of a mode 15 desktop with *Paint*. You will be prompted for a radius. This can be anything between 0 and 512. Obviously, the larger the value the larger the resulting image but the slower it will animate.

The PROCMAKESHAPE procedure does the hard work of working out the mapping needed and, by changing the formulae on line 1040, you can make the program map the sprite onto some very weird shapes. Try $x2 = r2 * \cos(2*a)$ or $x2 = r2 * \cos(a/2); y2 = r2 * \sin(\text{SQR}(a))$.

The first sin and cos (for x and y) determine the shape of the object (in polar coordinates); the second (for x2 and y2) determine how it is wrapped around the object.

Take a look at the butterfly on this page to see the program in action. It starts off as the normal image shown above and ends up with its wings wrapped around a sphere, as on the right.



MOVING WINDOWS

Programs: WindMove (Run-Image, WMdat)
Description: Desktop utility
Author: Andrew Cumming
Machine: 32-bit

This small application adds a little extra control to the desktop environment. Andrew describes his utility:

'WindMove allows any window on the desktop to be moved, scrolled in either direction and resized. It was designed with *FormEd* in mind, since it allows windows without title bars, scroll bars or a size icon to be moved, scrolled and resized respectively, without you having to repeatedly change all the window flags.

'When the application is started, an icon showing a greyed-out window with four arrows to each side appears on the icon bar. Pressing Select while on the icon will cycle through the four functions (move, resize, horizontal and vertical scroll). The relevant portion of the window and arrow are highlighted on the icon bar. Adjust will return to the greyed-out icon, as the facility is switched off.

'When you select a particular function, moving the pointer over the work area of any window on the desktop will result in the pointer changing to the

shape of a hand. You will then be able to drag the window.

'The program works by intercepting null events and monitoring the position of the pointer with SYS "Wimp_GetPointerInfo". When a click on Select or Adjust is detected, SYS "Wimp_DragBox" is used with a parameter from one to four; this results in one of the system drags: either move, resize or scroll.

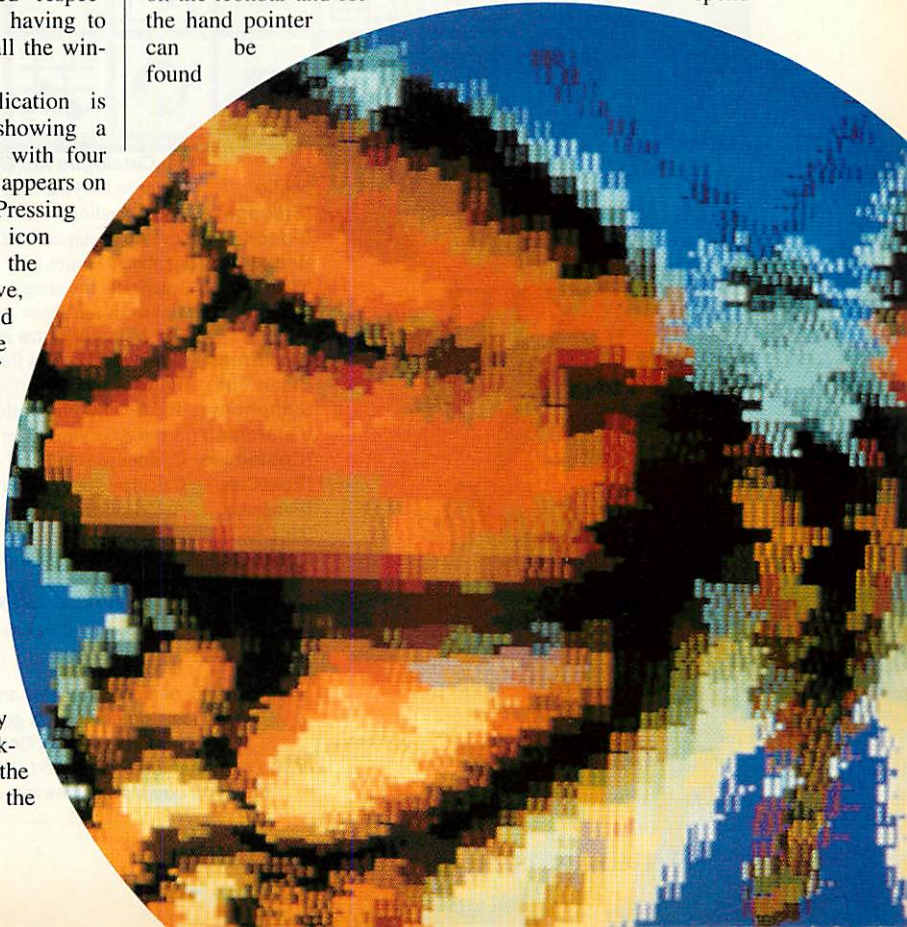
'Note that the pointer is reprogrammed to be pointer shape 1. This is important since pointer 1 is used as the default and pointers 3 and 4 are programmed by the *Hourglass* module. The sprites used on the iconbar and for the hand pointer can be found

in the file *Sprites*.' To use *WindMove* first create a directory (!WindMove) and save the !RunImage program inside it. Now, simply run the program WMdat from within !WindMove and this will create the !Run, !Sprites and Sprites files.

QUICK *DIR

Programs: FModAsm, MakeDList
Description: Quick directory finding utility
Author: Simon Heys
Machine: 32-bit

This utility will be a boon to those with hard discs who spend



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If you can beat the 6 defended targets and collect the code word then you could be the winner of a £50 Datafile voucher.

time out of the desktop. If you have a rambling directory tree and need to leap deftly between the branches this is what you need.

The utility takes the form of a module which is assembled by *FModAsm* and is saved in the current directory library as *FMod*. You will first need to run *MakeDList*. This scans the directory tree from \$ and builds up a file called *DirList*: simply a complete list of directories on the current disc, in order and zero-terminated. This is assembled into the module by *FModAsm*. Note that both programs expect to be run on your 'working' hard disc and *FMod* will be specific to that drive.

When you are ready, simply load the module with **FMod* and use the command provided, **FD <name>*, to select the directory you need. The **FD* command takes the name given and finds the first full pathname that contains it.

For example, this text is being saved in my directory *\$.StarInfo.1993.F-Jun*, so I could jump straight to this directory with **FD 1993.F-Jun*. I could then type **FD F-Jun* but this would match *\$.StarInfo.1992.F-Jun* which appears earlier in the tree.

Providing your directory names accurately describe what lies in the directories, you only need type a small portion of the desired destination. The last part of the name can be abbreviated, so, in the example above, **FD 1993.F* would have done the trick.

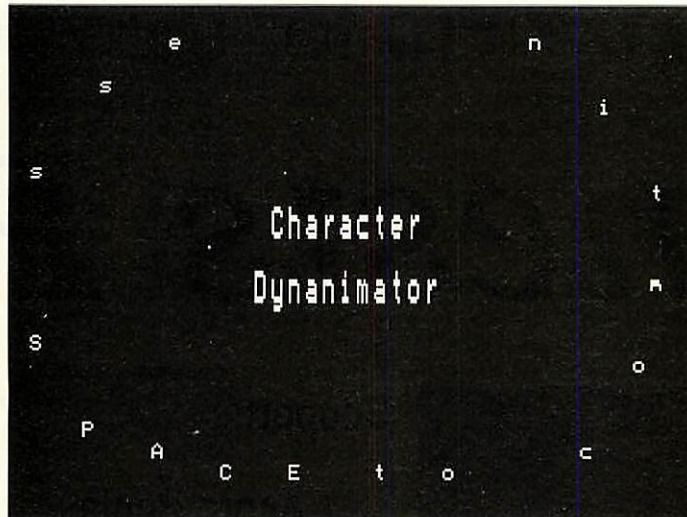
DYNANIMATOR

Programs: CharDyn, CDdemo, CDexamp, CDex2
Description: Animated text demo

Author: Andrew Bennett
Machine: Eight-bit

This spectacular eight-bit offering is ideal for adding a bit of life to your dull text screens. The *Character Dynanimator* animates characters according to predefined paths. Although the characters are plotted at TAB positions, the effect is smooth.

The work is done by a piece of machine code assembled by *CharDyn* and saved as *CDCode*. The three other demonstrations simply per-



Spectacular character animations with the Dynanimator

DYNANIMATION FORMAT

The following is a description of the dynanimator subprogram format:

| Byte | Description |
|--------|------------------------------------|
| 0 | number of subprograms |
| 1,2 | pointer to first subprogram |
| 3,4 | pointer to second subprogram |
| 5,6... | pointers to subsequent subprograms |

Each subprogram takes the following format:

| | |
|-----------|------------------------------------|
| a+0 | initial delay (1/50 secs) |
| a+1 | delay between letters (1/50 secs) |
| a+2 | direction (1=forward, &FF=reverse) |
| a+3 | length of string |
| a+4...b-1 | string itself |
| b, b+1 | first x, y co-ordinate pair |
| b+2, b+3 | second pair |
| b+4...c-1 | subsequent pairs |
| c | contains &FF to terminate program |

where a is the address of the start of the subprogram, and b and c are addresses that depend on the string length and number of co-ordinates.

form the command **LOAD CDCode* and call the routine when needed. Note that the routine is assembled at &900 and is a bit more than 512 bytes long, so creeping into the function key buffer.

It also uses workspace at &1100. This means that if you have a Master or Compact you should ensure PAGE is set to &1900 or above before running any of the demos. Alternatively, alter the addresses in *CharDyn* and re-assemble the code at a different place. All demos run in mode 7, where character plotting is fastest.

CDexamp is a simple example and shows not only how to call the animation routine but the basic format of an animation program. The code is loaded at &900 and called with X and Y pointing to the program. The format is summarised above. As you can see, each program is made up

of subprograms; these are executed simultaneously.

Typically, each word in a sentence, or even an individual letter in a word, might be animated using its own subprogram. A subprogram describes what text is to be animated, where it starts, how long to wait initially and between letters, and which points the letters should visit on their journey. These points are simply co-ordinates you would use in a *PRINT TAB(X,Y)* command. You can also specify the direction (1 or &FF); this determines whether the initial or final letter comes on first.

Of course, if you are animating a word you don't want all the letters to end up in the same place. In this case set bit seven of the X co-ordinates of a point (add 128 to it). The X co-ordinates of the letters will then be adjusted according to their position in the word.

We came up with the extra example *CDex2* to show how you can build up paths from Basic. The routine *PROCrand_path* takes as parameters the final X co-ordinate of a word and an offset (effectively the Y co-ordinate). It then builds up a random winding path from the bottom of the screen.

For a full-blown demo, now try *CDdemo*, which shows square, circular and sinusoidal paths and many other ideas.

Note that when constructing an animation, care must be taken not to wipe out earlier words with later ones. If one path crosses another, a word that has finished its movement may be affected by anything else whizzing past, so choose your routes carefully.

MIRA IMAGE

Program: Mira
Description: Fractal graphics
Author: John Williams
Machine: All

Fractal plotting is a common feature in **INFO*. John Williams from Exeter continues our homage to this subject with an exploration of Mira fractals. These fractals are named after the physicist who first investigated them.

We start with prescribed values for x_0 and y_0 , the co-ordinates of an initial point. Then, the (n+1)th point with co-ordinates (x_{n+1}, y_{n+1}) is determined from the previous point with co-ordinates (x_n, y_n) by the equations:-

$$f(x) = (1-A) \cdot X + 2A \cdot (1-g(x))$$

$$x_{n+1} = f(x_n) + B \cdot y_n$$

$$y_{n+1} = f(x_{n+1}) - x_n$$
 where $B = 1$, or slightly smaller and A is any non-zero positive constant less than 2. The function $g(x)$ must be chosen to satisfy the condition that its magnitude tends to zero as x increases indefinitely. The program contains eight different functions which obey this condition but many others exist.

The pixel corresponding to the computed co-ordinates x,y is scaled according to its factor and plotted on the screen with an offset. These values are found by trial and error so the final fractal is centralised, filling the whole screen.

The program *Mira* has been kept as simple as possible.

The *de facto* standard multimedia authoring system for the Archimedes

The Genesis family of multimedia authoring systems is the most widely used on the Archimedes, and now produces applications which can also run, without change, under Windows™.

Genesis Plus allows the creation of applications consisting of linked pages of information in a wide variety of formats. Pictures, sounds, animations and text can be added simply by dragging files into frames on your page - just like using a DTP package. Text can also be typed directly into frames and formatted to suit.

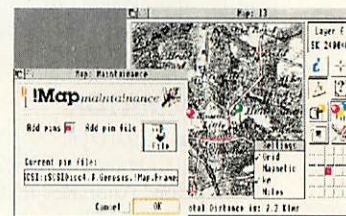
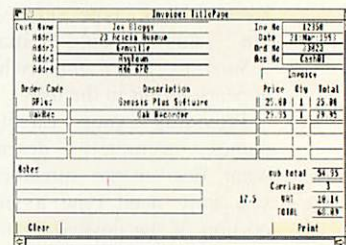
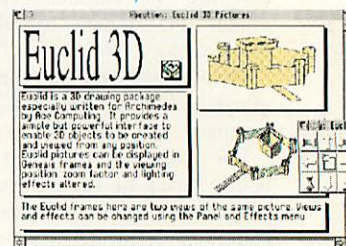
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Genesis Plus uses powerful compression algorithms so that data is stored efficiently. It is capable of running well even on 1Mb single floppy disc machines, but has sufficient power to manage even the largest of CDROM based databases.

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Eight example fractals have been included that make use of some of the *g*-functions defined. These can be plotted by entering their number. John encourages you to experiment with the data given. You can start simply by adding extra example shapes using the pre-defined *g*-functions.

For this you need to change *A*, *B*, x_0 and y_0 ; *A* should be between 0 and 2. Some values give dull groups of discrete curves. Also, avoid 0.5, 1 and 1.5 which produce lines of dots. *B* should be 1 or slightly smaller. Choosing a value for *B* of less than 1 spirals the fractal into hot spots, making good fractals harder to find.

The initial values of x_0 and y_0 need not be equal or positive. Choose from about -14 to 14. Notice that small changes in *A*, *B*, x_0 or y_0 can radically alter the fractal. Start with *xc* and *yc* roughly in the centre of the screen and *sc* about 25. Large values of *A* may need *sc* to be reduced. These can be tweaked once you have found a good shape. If you are feeling more adventurous, try adding extra *g*-functions to the data statements and using them to generate more fractals.

MOULDY MOUSE

Program: Mould

Description: Graphical demo

Author: David Llewellyn-Jones

Machine: 32-bit

I must say, we do get some odd programs at *INFO sometimes. Take *Mould* by

David Llewellyn-Jones, from Thundersley in Essex, for example. Any program that has a Mouldy Mouse option on the menu has to be severely peculiar.

There's not really much to say about *Mould*; just run it and see. David says (and we agree with him) that the Mouldy Mouse option is the best, and can form the basis for a game.

First, fill the whole screen with mould (holding down the middle and left buttons makes for the most interesting effect) then try and eradicate it all by using the right-hand button. This is not as easy to do as it looks, but we managed to do it... once.

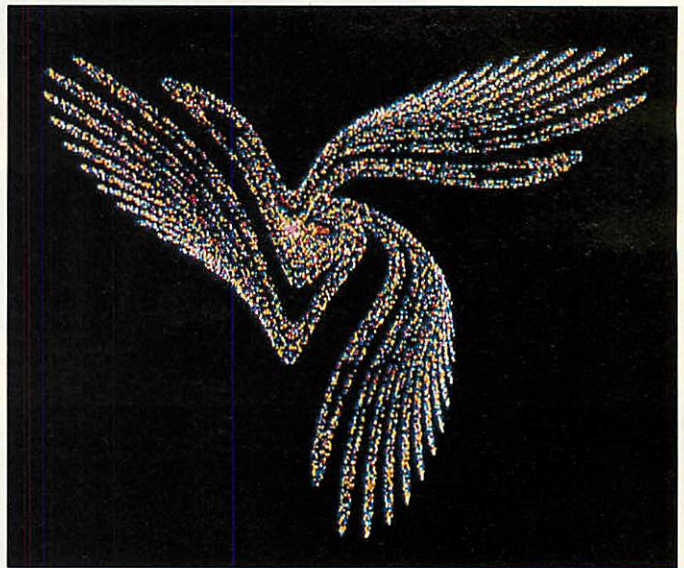
ONE LINE CORNER

We have four one-liners for all you miniaturisation fans. First up, a program from the March issue gets the treatment:

Bell7/1 is a one-line bell-ringing piece by DL. It was quite a struggle to get the original 7K down to one line, but after a lot of hair-pulling I made it fit. When you run it, it prompts you to input the number of bells, the pattern of changes in place notation and the delay after each bell.

Between 4 and 8 is normally suitable, 0 can be used to all but stop the sounding of the notes and, with a sneaky CTRL B, to obtain hard copy of the changes. The program will then ring rounds.

To ring the changes, press and hold down SHIFT until the start of the next pair of rounds.



Mira, Mira, on the wall

Once you are started, you can release SHIFT.

If you are after stunningly nasty visual effects, Richard Wilkie's *IceTrain/1* is your program. Run the program, then concentrate on the centre of the image (Arm 3s should be disabled first). Allow your eyes to go out of focus if you wish, then try to get the image to rotate in the opposite direction. Now press ESCAPE and keep your eyes on the screen. Well. Did you press ESCAPE? For the stronger willed, try placing your hand on a desk and examining it after staring into the depths.

Orblet/1, a ball game by Robbie Davies, is an easy one to explain. Press a mouse button to make your ball, sorry, orblet, bounce off the left-hand side of the screen. You can move over the thin lines, but the large blocks are deadly. How high can you go?

Also from Robbie Davies comes *Tune/1*. The soothing music here should come as a welcome relief after watching *IceTrain*. A very nice, and very clever program. A three-channel tune, complete with chords; we still can't work out how it works.

LIFE COMPETITION

And now you have your regular chance to show off your programming ingenuity with our latest challenge. It's based on the good old game of *Life*, featured time and again in this magazine and others. Some time ago, someone came up with the idea of *Life For Two*

— a competitive version of the original game. And here is your challenge. You must write an intelligent procedure that plays *Life For Two*.

All the entries will battle it out with each other in a knock-out competition and the author of the victorious routine will win £25 and a great deal of admiration from *Acorn User* readers throughout the world. Just for the record, the original *Life* works as follows. A simple world consisting of a grid or array is inhabited by simple beings or cells. Each square in the array may be empty or occupied by a single cell. After setting up an initial population (either deliberately or randomly) future generations are determined by applying a simple rule to each square.

Each square has eight neighbours (including diagonal ones) and the board wraps around horizontally and vertically. A new cell is created in an empty square which has exactly three cells as neighbours. An existing cell will survive another generation if it has two or three cells as neighbours. Any fewer than two and it will die from loneliness. Any more than three and it will be killed through overcrowding. From this simple rule, complex patterns of life emerge.

LIFE FOR TWO

In *Life For Two* there are two sorts of cell, one for each player. These are red and green on the screen. The game begins with an empty world, which, for the purposes of this



Mould

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challenge, is five by five squares in size. The players take turns to place a cell in an empty square. This continues for three rounds until six cells – three of each type – are on the board. Then the amended rule of *Life* is applied.

Each cell with less than two or more than three neighbours dies. Any cell with two or three neighbours will survive, even if those neighbours are of the opponent's type. A new cell is created as before, if there are exactly three cells as neighbours. In this case, the type of the new cell is set to whichever type numbers most among its neighbours. So, an empty square with two red and one green cells in adjacent squares will spawn a red cell next generation.

Now the players take turns in placing one more cell of their own colour in any empty square. The rule of *Life* is again applied, until one or both players' cells have been wiped out or until a fixed maximum turn number is reached, in which case the player with the most cells is the winner.

The 32-bit version is called *Lives32* and this program will be the one used to test all entries. Three thinking procedures have been supplied as examples. These should be saved separately in a directory called *Procs*.

The main game *Lives32* scans *Procs* and makes a list of all entries. It then plays each entry against the others at a

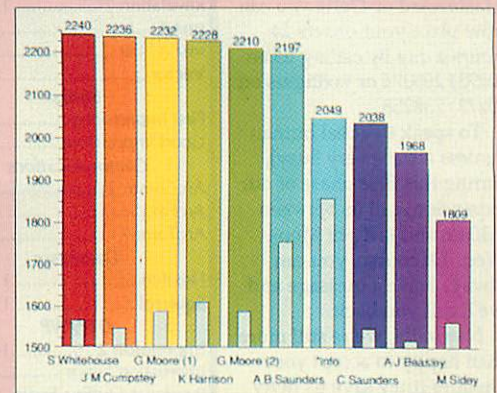
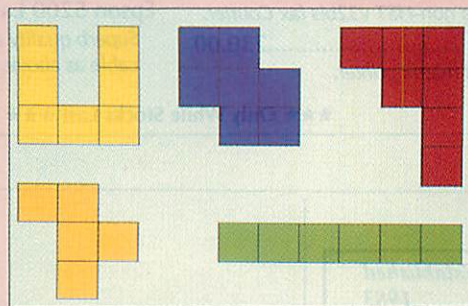
RESULTS OF OMINOES

We had a reasonable response to this challenge, not as good as the maze puzzle, but then it was a harder problem. The task we set was to try and fit ominoes (A domino has two squares, we provided shapes of up to five connected squares) onto rectangular boards, some of which had immovable blocks already placed on them. The winner, by a whisker of four pieces, is Stuart Whitehouse of Slough. £25 and our congratulations go to him.

Mike Cumpstey came a close second and Gareth Moore third. The top 10 entries (which include one of our own efforts) are shown on the right. The grey bars represent the time taken by each entry.

As promised when we originally set the challenge, we added a few extra ominoes to the set used by the program. A few of you noticed a mistake in the data lines which meant that one pentomino was not provided, so we corrected the data to generate this one properly and added the four other shapes shown below.

The finalists were run over 100 boards with the main_seed set to 281283. Stuart's winning entry can be found on the monthly subscriber's disc.



Many techniques were used to solve the problem, but the most common lines of attack were: connectivity – how many sides of the new piece were touching pieces already placed; fragmentation – the number of areas that would be created by placing a piece; gravity – the distance from the centre of gravity of the empty area.

Lots of entries also tested for symmetry of the piece to be placed, to cut down on the number of orientations tried.

Stuart's program used four different placement algorithms as the board slowly filled up. He also made use of a couple of timesaving tricks. First was a routine that filled in any gaps of one or two squares which couldn't otherwise be used, but would still get checked by each piece.

Secondly, when whole rows or columns were full at the edges of the board, the search area was reduced. Many thanks to everyone who took part. We hope you like our next challenge.

fixed number of games (set by `to_play%`). The three examples, in increasing order of cleverness, are *Stupid*, *Simple* and *Best*. A high-score table is shown after each match.

A thinking routine takes the form of a function with the

same name as the file containing it (converted to lower case). So, in *Procs.Simple* the thinking routine *FNsimple* is the one that actually supplies the next move. Each entry must have a unique name that is used for the thinking routine and the Basic filename. We suggest that you use your name (*FNjrhartley*) or post-code (*FNnw10ag*) so your routines don't clash with others. All variables used by a thinking routine must either be local or have a name prefixed with the unique name (*jrhartley_board%*).

The thinking routine obeys six parameters in all. These are the only variables from the main program the routine may use. They are as follows:

`board%` is the grid itself. This is a 25-byte block of memory containing the current state of the playing area. The first five bytes describe the first row, the next five the second row and so on. Each byte may be zero (empty), one or two (occupied by a player's cell).

`player%` is the player's

colour. This will be one or two and may vary between games.

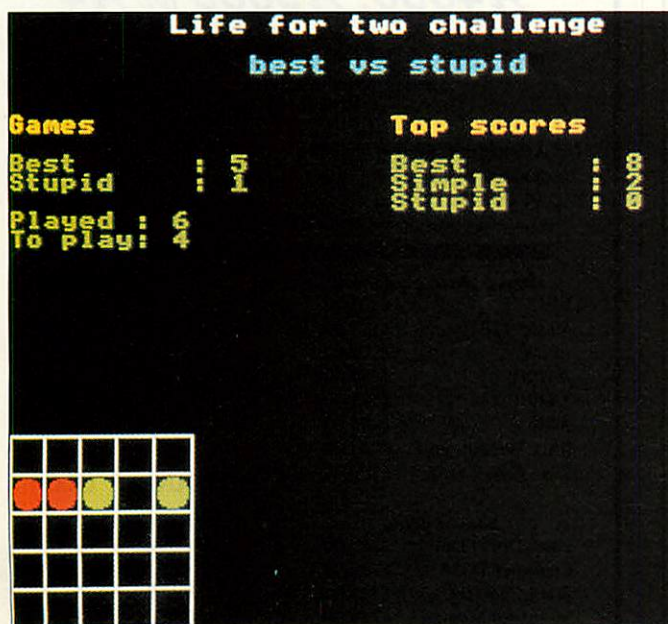
`turn%` is the turn number. This will be 1 for the first move and will increase by 1 each turn. Your routine will also be called once before play starts with `turn%=-1`. This is to allow initialisation of arrays and so on. In this case, the only other valid variable is `size%` and your routine should return zero.

`size%` is the size of the grid. For the purposes of the competition it will be five.

`first%` is the player who goes first. If `first%=player%` then the life rule will be applied after your opponent's move; clever routines may wish to take this into account.

`left%` is the time your routine has left to it in centiseconds. Your routine may wish to alter its strategy depending on the time left.

The value returned by your thinking routine should be a number in the range 0 to `size%*size%-1`. This is an offset into the block of memory containing the playing area. If



Best vs Stupid: guess which will win

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the offset is outside this range, or the square indicated is already occupied, a foul will be declared and the game forfeited. To enter you must supply a Basic program. This should contain both your thinking function and any other functions or procedures that it calls.

Variable and procedure names must be in accordance with the guidelines above. Entries can be accepted on 3.5 or 5.25in discs. Include also a text file containing your name and address.

If you would also like to include details of how your routine works these may be used when we publish the results in the October 1993 issue. As well as publishing the winning entry (which will earn £25 for its creator) we will publish interesting or novel entries if space permits. We also hope to provide a playable version of *Life For Two*, letting you pit your wits against the best solutions.

EIGHT-BIT ENTRIES

From previous challenges we know some of the best entries come from eight-bit owners. However, because of the competitive nature of this challenge, we have to choose one machine to test the entries on. For practical reasons, this will be an Arm3-based machine.

Eight-bit users are welcome to enter however. Providing you stick rigidly to standard BBC Basic (no references to specific memory locations like &900 or 6502 assembly language) your routines will work fine on our 32-bit test machine.

So you can try out your rou-

times we provide *Lives8*, essentially the same as *Lives32* but suitable for eight-bit machines. It can run in mode one or mode five (set mode% at the start depending on the memory of your machine) and contains eight-bit versions of the *Simple* and *Best* thinking routines at the end.

You should replace one of these with your own routine and change the strings in the arrays *proc\$()* and *player\$()* accordingly. Like the 32-bit users, please use a unique name and use it as a prefix for all non-local variables.

OTHER RULES

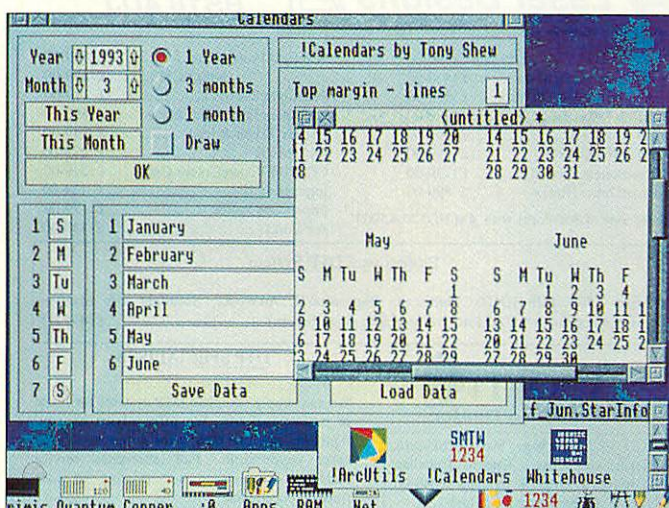
1 Entries will be divided into groups of ten and surplus entries split evenly between the groups.

This will be done randomly. Each entry will play two games against each of the other entries in its group, once going first and once second. The top five entries, and any tying for fifth place, will proceed to the next round.

2 Step one will be applied zero or more times until there are fewer than 20 entries left. These will be played against each other, this time with four games between each possible pairing (two going first, two going second).

If there is a tie for first place, all those tying will be entered into an extra round. Each pairing will then play 10 games. If there is still a tie, the prize will be divided.

3 Any entries causing an error or taking an inordinately long time for a move (more than three minutes) while in operation will be expelled from the competition.



Calendars: free on the subscriber's disc

4 A time limit of three minutes per game will be enforced. If a routine runs out of time the game will be forfeited.

5 No machine code entries are permitted. This restriction has been made for two reasons. Firstly, 6502 users would be at a disadvantage since the testing will be on a 32-bit machine, and, secondly, we felt that the spirit of the competition is to find ingenious rather than brute-force solutions to the problem.

6 We have deliberately not put a limit on memory usage since this is difficult to enforce. Please bear in mind that the entries will be tested together on a standard 4Mb machine and we reserve the right to exclude entries which use up sufficient memory to halt the testing process in some way.

7 Your routine must not tamper with the main program in any way, or access variables other than those passed to it.

8 You may enter up to three different routines. There must be no collusion between them.

9 The closing date for entries is 16 July 1993.

TACTICS AND DEVICES

The three examples show certain devices that may be of use to entrants. *Stupid* is just that, choosing any random empty square for its move.

Simple scans the board to find squares with two adjacent cells that might produce a new cell next generation.

Best actually tries out each possible move, applies the life rule and counts up the cells of each colour to find which move has the best effect on the relative populations. *Simple* and *Best* both copy the memory block at board% into Basic arrays with edges duplicated on each side. This makes checking quicker.

*DISC

We have a couple of bonuses for subscribers this month (apart from Stuart Whitehouse's winning entry). Both can only be found on the monthly subscriber's disc. The first comes from Tony Shew of Rochester in Kent.

He has submitted a desktop calendar program which produces monthly or yearly calendars in either plain text or draw text-area format. The program has been written in C and the full source code, template file, sprites and help text is included within the application directory.

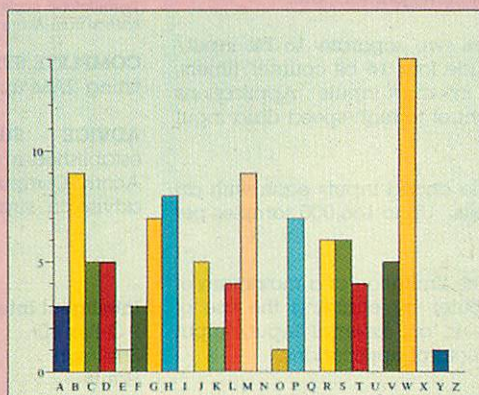
Our second freebie has been sent in by Andrew Timms of Watford. *ArcUtils* contains a small selection of desktop utilities that many of you will find very useful. For full subscription details turn to p63.

*QUIT

Listings, applications, hints, tips, requests are always welcome as contributions to *INFO. All but the shortest listings should be on disc together with a description. Please write your name and address on all discs. A stamped, self-addressed envelope will ensure the return of your disc.

We also want to hear from you if your Christian name begins with E, F, O, U, V, X, Y or Z and your surname begins with I, N, Q, U, X or Z. As you can see from the special bar chart on the right, these initials are sadly lacking. We would also be grateful for any explanation as to the number of W surnames.

Send your submissions to: *INFO, BBC Acorn User, Redwood Publishing, 101 Bayham Street, London NW1 0AG.





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X Window System R11.4

This software package, developed in association with Acorn Computers, converts a RISC OS based Archimedes into an X Terminal. The software will allow communication with X clients over Ethernet or Econet. Graphic support includes both the state machine G8 and Computer Concepts ColourCard.

| | |
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Gnome Computers offers a complete range of transputer and i860 boards to fit into either RISC OS or RISC iX based Archimedes machines. Prices start at £1385 for a single 10 MIP, 2 MFLOP transputer system including a parallel FORTRAN-77 compiler.

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Intelligent Interfaces are Bradly Associates distributor for GINO-F 3D, GINOGRAPH and GINOSURF for Acorn RISC OS-based computers.

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INTELLIGENT INTERFACES



Welcome to the first instalment of Hints and Tips. This is the spot where you get the chance to share that life-saving tip with the Acorn community. Over to you...

HINTS AND TIPS

Technical trickery and useful tips from your fellow readers

CUSTOMISED PALETTE

Ben Summers

Most modern applications contain message files in which details of menus, error messages and other text items are stored; the idea is that you can change the message file to customise the application without having to rewrite the application itself. The Rom applications are no exception, and probably the most useful change you can make is to set up your own mode list for the Palette Utility.

The method is based on the ability of Risc OS to search for files along path system variables. For those of you who haven't met this, you can set up a system variable with a name like `System$Path`, containing pathnames of directories separated by commas (but note, each must end in a '.').

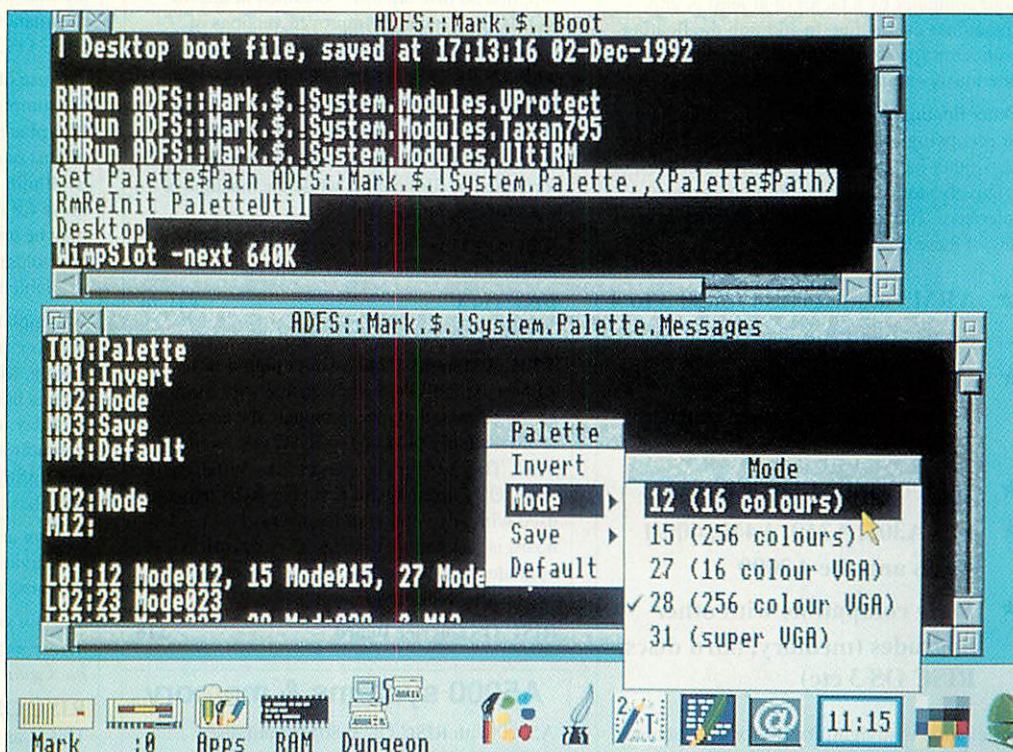
When you want to access a file on this path, you use a filename such as 'System:filename'. If the file is not found in the first directory in the path, it will be looked for in the next directory in the list and so on. If it isn't found in any of them, a 'File not found' error will be reported as usual. The Rom applications use paths to access their resource files, including their message files.

First, choose Open '\$' from the Apps menu. Open up the *Resources* directory, and then copy the *Palette* directory to a convenient place on your hard disc, for instance inside the *!System* directory. The following assumes that you have placed it there.

First, delete the *Templates* file from inside the directory as you don't need it (unless you want to change that as well). Now add the following three lines near the beginning of your desktop boot file:

```
Set Palette$Path adfs::Hard
Disc.$.!System.Palette., <Pa
lette$Path>
RMReInit PaletteUtil
Desktop
```

The first line changes the palette path to make it search



A few extra pathnames are all it takes to customise your palette

first in your new directory (make sure the pathname is correct for your disc) and then in the Rom directory. The second line re-initialises the Palette utility, and the third makes it appear on the iconbar.

Now load the *Messages* text file into *Edit* so we can customise the contents. The line you need to change depends on your monitor; if you have a normal monitor, change the line beginning 'L??:', and if you have a multisync, the one beginning 'L01:'. The rest of the line defines the mode menu for that type of monitor. The format of each entry is:

<mode number><space><desc.>

Follow this exactly, otherwise it won't work. The mode number is the mode which will be set when the menu entry is chosen, and the mode description is what is displayed in the menu. It actually references another line.

You will notice that further down the file there are a lot of lines beginning 'Mode0xx:'. You can add new ones for modes that are not listed.

There is also a special entry '? M12'. This is the writable entry where you can type in modes not listed. Unfortunately, you cannot have more than one. Try it, and see what happens...

An example for multisync monitors is:

```
L01:12 Mode012, 15 Mode015,
20 Mode020, 27 Mode027, 39
Mode039, 21 Mode021, 29 Mo
de029, 35 Mode035, 0 Mode00
0, 31 Mode031, ? M12
```

QUICK FILE SELECTION

Alan Hodson

Risc OS 3 has a useful facility allowing you to drag a box in a filer window to select multiple files. However, the files inside the box are not necessarily selected, but their status is simply toggled, as if a logical NOT were applied.

This can be most useful. For example, if a filer window contains 10 files and you only want to delete eight of them, then select the two files you wish to keep, and drag a box round all 10 files. The two you wish to keep will become de-

selected, and all the rest will be selected, enabling you to delete all eight files without having to select each one separately.

JUNIOR INTO SENIOR

PG McTiernan

If you have upgraded from *Impression Junior* to *Impression 2*, you may be annoyed to find that double-clicking on an old *Junior* document does not load it into *Impression*, but gives an error message.

Impression can be altered to load *Junior* files quite easily. Simply use *Edit* to add the following line:

```
Set Junior$Path <Obey$Dir>.
!Run
```

to the files *!Impress.!Boot* and *!Impress.!Run*, just after the line

```
Set Impression$Path <Obey$D
ir>.!Run
```

Now your *Junior* files will load straight into *Impression*.

If you have any of your own tricks to share, send them to us at: Hints and Tips, *BBC Acorn User*, 101 Bayham Street, London NW1 0AG.

ARM3 upgrade with floating point accelerator option

The first ARM3 upgrade to allow a floating point accelerator chip to be connected directly to the ARM3's 32-bit coprocessor bus. The 25MHz ARM3 itself increases the speed of your computer by a factor of at least 3, and sometimes even more. In addition the floating point chip speeds up maths operations previously emulated by software.

Other floating point units have the disadvantage of occupying a slot in the backplane. They are also either incompatible with ARM3 boards, or relatively slow due to the 16-bit backplane interface. This upgrade does not suffer from any of these disadvantages.

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RISC OS 3

Acorn's new operating system for their range of RISC computers. The old version of RISC OS (2.00) is just 512K long, whereas OS 3 contains 2Mb of code.

Many applications which were previously supplied on disc are now contained in the OS ROMs. This includes improved versions of Draw, Paint and Edit. Because they are available on ROM they are always instantly accessible, and also occupy less RAM space.

Other features include extra "background" operations. For example, discs can now be formatted or files copied while the machine is used for other purposes.

RISC OS 3 may be used on the A305, A310, A440, 400/1 series, A3000, A540 etc.

RISC OS 3 £41.70

A305, A310 and A440 owners please note.

Although the ROM sockets inside your machine are large enough to accommodate the new ROMs, simply plugging in RISC OS 3 *will not work*. This problem is overcome by installing the RISC OS Carrier Board first. The RCB may be used with any version of RISC OS. This carrier board is compatible with memory boards, ARM3 upgrades and does not in any way obstruct expansion cards ("modules").

RISC OS Carrier Board £18

A5000 systems & memory

A5000 with RISC OS 3, 80Mb hard disc, multisync monitor and ARM3. - £1399.

A5000 learning curve. - £1445.

Free 4Mb RAM upgrade included in the price.

2Mb memory board (4Mb total) - £75

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Hard disc upgrades

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Various

Aleph One 386 1Mb PC Card - £390 (4Mb £475)
Aleph One 486 1Mb PC Card - £490 (4Mb £575)
Impression 2 - £130

Free price list available upon request.
Prices exclude VAT.

A310 & A305 upgrade column

Memory expansion

Extra memory is without doubt the most worthwhile addition to any A300 series machine. Some programs won't even run with only 1Mb, and 2Mb is a bare minimum. Certain applications, desktop publishing for example, benefit from a 4Mb system.

2Mb - £89

4Mb - £128

Compatibility. The memory is detected and used by the machine automatically, so there are no special commands needed. Works with both RISC OS 2 and RISC OS 3.

The use of only eight RAM chips ensures low power consumption. Compatible with ARM3 upgrades, backplanes, hard discs etc. This upgrade is supplied on just one, compact board measuring only 195mm by 40mm. Four-layer circuitry reduces electrical noise for trouble-free operation. The 2Mb upgrade may be upgraded to 4Mb later by the user, without any soldering. A copy of the fitting instructions is available free of charge.

A complete fitting service is available for our RAM boards covering courier collection, installation and testing, MEMC1a, return delivery and guarantee. This is normally a three-day service (eg, collected Monday, returned Wednesday). We have been upgrading 300 series computers for over three years, and during that time a reliability record second-to-none has been established.

Is there any other 300 series RAM upgrade which has been available for as long as this one, and which has the same reputation for quality and reliability? No.

Still not sure? Compare it with the competition before making up your mind. Use our 14-day money-back guarantee to check it out for yourself.

RISC OS Carrier Board £18

This is an easy to install adaptor board for the larger RISC OS 3 ROMs. A set of links on the board allows it to be used with RISC OS 2 and easily adapted for RISC OS 3 later. Suitable for use with the A305, A310 and A440. The adaptor has been fully tested with RISC OS version 2 and version 3. It is fully compatible with other hardware upgrades such as the RAM board described above, ARM3's, backplanes, VIDC enhancers and expansion cards.

Note: Early versions of certain RAM upgrades from other suppliers do not work properly at first with RISC OS 3. The problem can be completely overcome simply by changing a chip on the RAM board. IFEL can supply a replacement chip for only £3. Please ring for further details.

4-slot backplane with fan £57

Combination deals

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So we come to the final instalment in this programming series. To round the whole thing up, this month I am not going to focus on a specific topic. Instead, I'll look at useful shortcuts and programming techniques and try to answer some of your questions.

How can I deal with non-integer arithmetic?

Handling non-integer arithmetic in machine code is no easy matter, as Arm instructions are only designed to deal with integers. Many of you will have heard of the Floating Point Emulator, which is simply an operating system module that pretends to be the Floating Point Accelerator chip; in other words, it provides a number of assembler instructions to deal with floating point numbers.

The FPA chip itself (which would run very much faster than the emulator does) has been in development for an awfully long time and has yet to be seen. However, the Arm developers have included instructions which give the processor access to a co-processor (such as the Floating Point Accelerator) and you can use these within your code. The C compiler, for instance, produces code containing these instructions. These instructions are beyond the scope of this article, unfortunately, but here's a shortcut, well-known by programmers, which uses fixed-point numbers.

Take the full 32 bits available to you and place an imaginary decimal point between, say, bits 15 and 16. This effectively gives you a 16-bit number with 16 bits-worth of decimal places. All arithmetic on fixed-point numbers behaves as you expect, but is considerably faster than the emulated floating point. The only time you have to be careful is when you use multiplication, as the decimal point will move.

Multiplying two eight-bit fixed point numbers together will give you the correct answer but with 16 bits of fraction, so don't forget to shift the result down with an ASR afterwards. *Arm1* demonstrates the method. Note that some fractions are impossible to represent using this, like $1/10^{th}$, for example. So, 10×0.1 doesn't give you quite the result you would expect.

How do I divide numbers in Arm code?

The Arm can add, subtract and multiply quite happily with single instructions, but unfortunately there is no divide instruction; luckily there is the magic code given in *Arm2*. This divides R0 by R1 and returns the integer result in R0 and the remainder in R1. In other words: R0 DIV R1->R0, R0 MOD R1->R1. The first few instructions initialise a few registers and make sure that the two numbers to divide are positive.

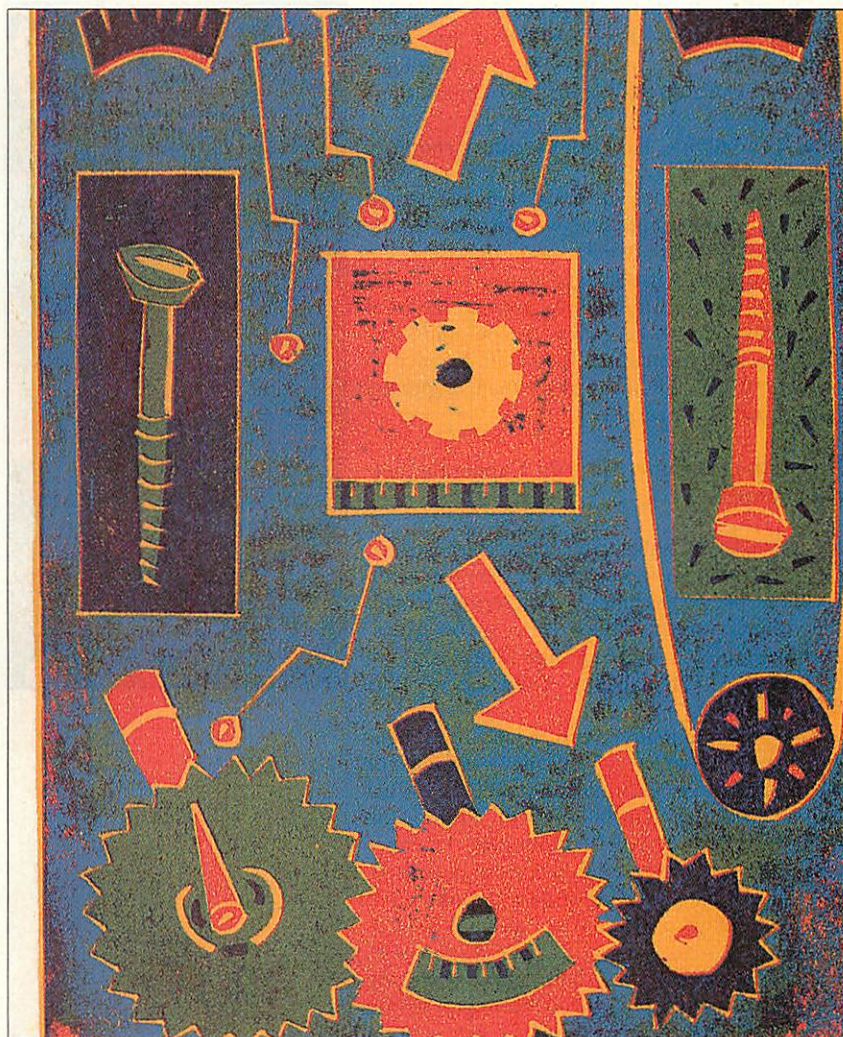
The register sign contains the sign of the final result. If both are positive or negative, the result will be positive, otherwise it will be negative; hence an EOR will do the trick for us. Two other shortcuts are used by the rest of the routine.

The first saves wear and tear on your fingers and helps eliminate typing errors by implementing a macro called FNdiv. Macros allow you to repeat a section of code, with different parameters if necessary, without having to physically duplicate the instructions. Essentially it is a

Dave Lawrence finishes off his programming series with some handy shortcuts

subroutine call, but instead of assembling a branch (with link) to the code, the subroutine itself is included in-line with the main assembly. This uses more memory, but the resulting routine runs a lot quicker, as the processor doesn't have to keep executing time-wasting jump instructions all the time.

The second shortcut does save time in execution. Before each block of eight calls to FNdiv, a quick check is made to see if the dividend (the



ASSEMBLY LINE

number to be divided) is big enough to need this block of divisions. For example, if you were trying to divide the number 100, you wouldn't need to perform any of the first three blocks.

Fine, I can divide. How about square roots?

Again, there is no square root Arm instruction, but, with a little bit of code, we can come up the routine illustrated in *Arm3*.

This calculates the integer square root of R0 and returns the result in R0. As you can see from the PRINT loop at the end of the program, this routine actually calculates the result rounded to the nearest whole number rather than simply the integer part of the result.

I'm writing a game. How do I generate random numbers?

Many random number generators are based on the short program segment from the chapter on sound in the Programmer's Reference Manual. This shows how a random bit can be generated using a seed value and the magic constant &1D872B41. The listing *Arm4* shows this theory in action.

The seed is initially set to the Basic pseudo-variable TIME, which is sufficiently random for our purposes. On each call, the seed is shifted left one place. If a 1 falls out of the top, the register is EORed with the constant. In either case, the seed is stored ready for the next time. The state of the carry flag is then 'random'. We use this to return a zero or one, which is used as a colour.

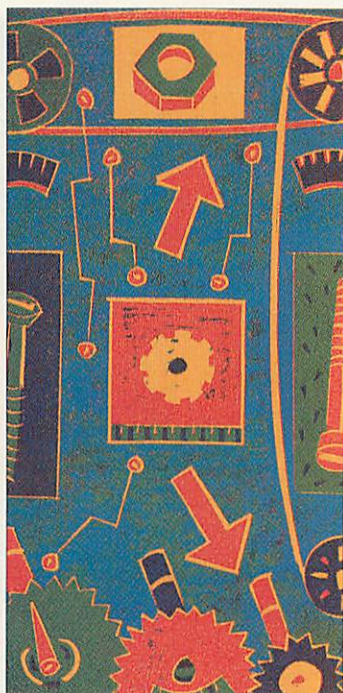
This algorithm is fine for producing individual random bits, but collecting a stream of them and producing a larger number is not a very good method of generating random numbers. A much better way is shown in *Arm5*. Again, a seed value (initially set to TIME) is used, but now two magic numbers are used (stored at c1 and c2). The routine is an implementation of the function: $\text{seed} = (\text{seed} * a + c) \bmod m$, where a, c and m are carefully picked.

As we don't want to be lumbered with a division in our code, we want m to be 2^{32} , so the fact that our registers are 32 bits wide will perform the division for us for free. Given this, the multiply and add can be performed amazingly quickly and neatly with one MLA instruction. So why are there two?

Well, using this system, the bottom bits of the number tend not to be *that* random. So, you can either ignore them (by shifting the result down) or generate a second number and EOR the two together, with one rotated by 16 places, as this program does. This slows the process down a bit, so the first method is preferable if you don't need full 32-bit random numbers.

How can I claim some workspace for a subroutine?

A subroutine often needs a small amount of temporary workspace. This can be reserved by the main program and a pointer passed to the routine, or the memory can be set aside close to the subroutine, so an ADR can get to it. A much neater way is to use the stack. Say you need 32



bytes of memory, you could say:

```
SUB sp,sp,#32
```

```
MOV ptr,sp
```

at the start of the routine and

```
ADD sp,sp,#32
```

before returning. If you are not calling any further routines that use the stack, from within this one, this can be made simpler by just saying SUB ptr,sp,#32 at the start of the routine. Unless you've set up your own stack (and therefore know how big it is) you must be careful you don't claim too large a chunk in this way and fall off the bottom of the memory allocated to the stack.

What is the easiest way to code AND and OR?

This depends on the situation, but a particularly neat way involves adding condition codes to any instructions. I covered this method last August, but it is worth repeating. Say you need to check if R0 is 1, 4 or 17 and to set R1 to 1 if it is, you can use:

```
CMP R0,#1
```

```
CMPNE R0,#4
```

```
CMPNE R0,#17
```

```
MOVEQ R1,#1
```

In other words, the Z flag will be set when a match of R0 is found, in which case none of the rest of the compares will be executed, and R1 will be set to 1. If none of the compares are true, Z will remain clear and R1 will be left untouched. A similar system can be used for AND. If you needed to check if R0 was 3, R1 was 5 and R2 was 11, you could use:

```
CMP R0,#3
```

```
CMPEQ R1,#5
```

```
CMPEQ R2,#11
```

```
BEQ all_correct
```

The Z flag is kept set if each comparison is met. As soon as one fails, Z is cleared and no more comparisons are made.

What's the easiest way to swap two registers?

This is an interesting question because you may think you need a third register to complete the swap:

```
MOV temp,reg1
```

```
MOV reg1,reg2
```

```
MOV reg2,temp
```

This may be impossible in certain situations (without resorting to storing registers in memory). With a little thought, though, you can do the same function using just the original registers:

```
EOR reg1,reg1,reg2
```

```
EOR reg2,reg1,reg2
```

```
EOR reg1,reg1,reg2
```

How can I plot sprites? How do you read the keyboard? What is the best way to generate sound? How can I calculate sines and cosines? What are all these SWI calls for?

Well, I'm afraid all these topics are beyond the scope of this article. They, do, however, frequently crop up in the pages of *INFO, so keep your eyes on those pages for more advanced Arm programming. Likewise, if you have any queries on the intricacies of Arm code, please write to us at *INFO and we'll do our best to answer your problem.

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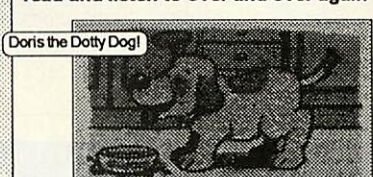
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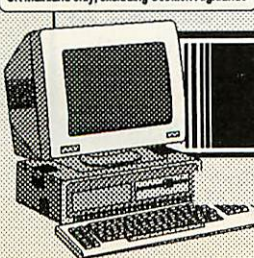


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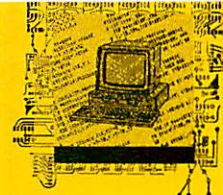
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HOW TO ENTER THE PROGRAMS

This section describes how to enter and use the more complicated programs in the yellow pages. A lot of the explanations mention the CSD: for more details on the Currently Selected Directory, see the box below.

3D GRAPHICS (page 90)

3DGraphics1 - 3DGraphics5

The first three programs (*3Dprocs*, *3Ddemo1* and *3Ddemo2*) need to be saved inside the same directory, which must be set to the CSD. Next, create a directory called *Objects* in the same directory as the three above programs are saved, and inside this directory save the two text files *House* and *World1*.

The two programs you can run are *3Ddemo1* and *3Ddemo2*, and both of these programs access the functions in *3Dprocs* and the data in *House* and *World1*.

*INFO (page 93)

Info1 - Info4

Save all four programs on the same disc. To assemble the machine code, run *CharDyn* which saves a file called *CDCode*. To ensure that the three example programs all work, make sure that the *CDCode* file is in the same directory as the programs.

Info5 & Info6

Save the program *MakeDList* on the disc you wish to scan,

and set the CSD to a directory where the file *DirList* will be saved. Then run the program *FModAsm*, and the *FMod* module will be saved in that directory.

Info7 & Info8

To create the full application, first create a directory called *!WindMove* and open it up by double-clicking on it with SHIFT held down. Then save the programs *!RunImage* and *WMDat* inside the directory. Finally, set the CSD to this directory and double-click on *WMDat* to create the *!Run*, *!Sprites* and *Sprites* files. The application is now complete.

Info16 - Info19

Save the first program, *Life32*, in a directory, and set that directory to the CSD. Next, create a directory called *Procs* in the same directory, and inside this directory save the three programs *Best*, *Simple* and *Stupid*.

To run the Life program itself, double-click on *Lives32*. Eight-bit users need only type in and run one program, *Life8*, as the functions are included at the end of that program.

Setting the Currently Selected Directory (CSD)

Some of the explanations above require the CSD to be set to a certain directory for them to work. To do this, you must first create an Obey file (using Edit), containing just the following line:

```
Dir <Obey$Dir>
```

Next save it under the name *ThisDir* in the directory you wish to set as the CSD. Finally, double-click on *ThisDir* to set the CSD to that directory.

COMPATIBILITY CHART

Use this chart to check if a program will work on your machine. There are two columns, one for eight-bit machines like the Model B and Master 128, and one for 32-bit machines, like the A3000, A400 or A3010. If there is a star for the program in the column then it will work on your machine. Special exceptions and hardware requirements are listed as foot notes at the end of the table.

| Article | Program Name | 8-bit | 32-bit |
|------------------------------|--------------|-------|--------|
| 3D GRAPHICS (page 90) | | | |
| 3DGraphics1 | 3Dprocs | | * |
| 3DGraphics2 | 3Ddemo1 | | * |
| 3DGraphics3 | 3Ddemo2 | | * |
| 3DGraphics4 | House | | * |
| 3DGraphics5 | World1 | | * |
| 3DGraphics6 | PerspDemo | | * |

*INFO (page 93)

| | | |
|-------|---------|---|
| Info1 | CharDyn | * |
| Info2 | CDdemo | * |
| Info3 | CDexamp | * |
| Info4 | CDex2 | * |

| | | | |
|--------|------------|---|---|
| Info5 | FModAsm | | * |
| Info6 | MakeDList | | * |
| Info7 | !RunImage | | * |
| Info8 | WMDat | | * |
| Info9 | Mira | | * |
| Info10 | Mould | | * |
| Info11 | Distort | | * |
| Info12 | Bell7/1 | * | * |
| Info13 | IceTrain/1 | * | * |
| Info14 | Orblet/1 | | * |
| Info15 | Tune/1 | | * |
| Info16 | Lives32 | | * |
| Info17 | Stupid | | * |
| Info18 | Simple | | * |
| Info19 | Best | | * |
| Info20 | Lives8 | * | |

ASSEMBLY LINE (page 105)

| | | |
|------|------|---|
| Arm1 | Arm1 | * |
| Arm2 | Arm2 | * |
| Arm3 | Arm3 | * |
| Arm4 | Arm4 | * |
| Arm5 | Arm5 | * |
| Arm6 | Arm6 | * |

Listing Info1

```

10 REM >CharDyn (Info1)
20 REM Character Dynamizator Sour
30 REM By Andrew Bennett
40 REM For 8-bit machines
50 REM (c) BAU June 1993
60 :
70 MODE 7
80 PROCSetup
90 PROCassem
100 PROCcheck
110 PRINT "Saving 'CnCode'"
120 OCLC"SAVE CCode "+STR$mem%+" "+
+STR$(theend-runanin)+" "+STR$code%+"
+STR$runanim
130 END
140 :
150 DEF PROCSetup
160 code%:=900:data%:=1100
170 maxprogs%:=4
180 maxobj%:=32
190 zpl:=70:zp2:=472
200 osbyte:=4FF4:oswrch%:=FFEE
210 DIM mem%:s1000
220 ENDPROC
230 :
240 DEF PROCassem
250 PRINT "Assembling..."
260 FOR opt%:=4 TO 6 STEP 2
270 P%:=code%:O%:=mem%
280 OPT opt%
290 .runanim
300 STX zpl
310 STY zpl+1
320 LDY #0
330 LDA (zpl),Y
340 BEQ ra_exit
350 CMP #maxprogs%+1
360 BCS ra_exit
370 JSR setup_progs
380 JSR setup_objs
390 .ra_loop1
400 LDA #19
410 JSR osbyte
420 JSR draw_objs
430 JSR run_objs
440 JSR run_progs
450 LDA ob_act_root
460 BNE ra_loop1
470 LDA pr_root
480 BNE ra_loop1
490 .ra_exit
500 RTS
510 :
520 .setup_progs
530 TAX
540 LDA #0
550 .sp_loop1
560 STA pr_next-1,X
570 INY
580 LDA (zpl),Y
590 STA zp2
600 INY
610 LDA (zpl),Y
620 STA zp2+1
630 STY temp1
640 LDY #0
650 LDA (zp2),Y
660 STA pr_wait-1,X
670 INY
680 LDA (zp2),Y
690 STA pr_delay-1,X
700 INY
710 LDA (zp2),Y
720 STA pr_dir-1,X
730 INY
740 LDA (zp2),Y
750 STA pr_len-1,X
760 CLC
770 LDA zp2
780 ADC #4
790 STA pr_strio-1,X
800 LDA zp2+1
810 ADC #0
820 STA pr_strih-1,X
830 CLC
840 LDA pr_strio-1,X
850 ADC pr_len-1,X
860 STA pr_routelo-1,X
870 LDA pr_strih-1,X
880 ADC #0
890 STA pr_routehi-1,X
900 LDA #0
910 LDY pr_dir-1,X
920 BFL sp_dirok
930 LDA pr_len-1,X
940 SBC #0
950 .sp_dirok
960 STA pr_char-1,X
970 LDY temp1
980 TAX
990 DEK
1000 BNE sp_loop1
1010 STA pr_root
1020 RTS
1030 :
1040 .setup_objs
1050 LDA #0
1060 STA ob_act_root
1070 LDY #maxobj%
1080 .so_loop1
1090 STA ob_next-1,X
1100 TAX
1110 DEK
1120 BNE so_loop1
1130 STA ob_del_root
1140 RTS
1150 :
1160 .draw_objs
1170 LDY ob_act_root
1180 BEQ dro_exit
1190 .dro_loop1

```

```

1200 STX temp1
1210 LDA ob_lastx-1,X
1220 CMP #&FF
1230 BEQ dro_notdel
1240 LDY ob_lasty-1,X
1250 JSR tab
1260 LDA #32
1270 JSR oswrch
1280 LDY temp1
1290 .dro_notdel
1300 LDA ob_y-1,X
1310 STA ob_lasty-1,X
1320 TAY
1330 LDA ob_x-1,X
1340 STA ob_lastx-1,X
1350 CMP #&FF
1360 BEQ dro_ignore
1370 JSR tab
1380 LDY temp1
1390 LDA ob_char-1,X
1400 JSR oswrch
1410 .dro_ignore
1420 LDY temp1
1430 LDY ob_next-1,Y
1440 BNE dro_loop1
1450 .dro_exit
1460 RTS
1470 :
1480 .tab
1490 TAX
1500 LDA #31
1510 JSR oswrch
1520 TAX
1530 JSR oswrch
1540 TTY
1550 JMP oswrch
1560 :
1570 .run_progs
1580 LDY #0
1590 LDY pr_root
1600 BEQ rp_exit
1610 .rp_loop1
1620 LDA pr_len-1,X
1630 BNE rp_notfin
1640 LDA pr_next-1,X
1650 STA pr_next-1,Y
1660 TAX
1670 BNE rp_loop1
1680 BEQ rp_exit
1690 .rp_notfin
1700 LDA pr_wait-1,X
1710 BNE rp_waiting
1720 LDA ob_del_root
1730 BEQ rp_nextiter
1740 STX temp1
1750 STY temp2
1760 LDY temp1
1770 JSR open_obj
1780 LDY temp1
1790 LDY temp2
1800 CLC
1810 LDA pr_char-1,X
1820 ADC pr_dir-1,X
1830 STA pr_char-1,X
1840 DEC pr_len-1,X
1850 LDA pr_delay-1,X
1860 STA pr_wait-1,X
1870 BEQ rp_loop1
1880 .rp_waiting
1890 DEC pr_wait-1,X
1900 .rp_nextiter
1910 TAX
1920 TAY
1930 LDY pr_next-1,Y
1940 BNE rp_loop1
1950 .rp_exit
1960 RTS
1970 :
1980 .open_obj
1990 TAX
2000 LDA ob_next-1,X
2010 STA ob_del_root
2020 LDA ob_act_root
2030 STA ob_next-1,X
2040 STX ob_act_root
2050 LDA #&FF
2060 STA ob_lastx-1,X
2070 LDA #0
2080 STA ob_rel-1,X
2090 LDA pr_routelo-1,Y
2100 STA ob_routelo-1,X
2110 LDA pr_routehi-1,Y
2120 STA ob_routehi-1,X
2130 LDA pr_strio-1,Y
2140 STA zpl
2150 LDA pr_strih-1,Y
2160 STA zpl+1
2170 LDA pr_char-1,Y
2180 STA ob_offset-1,X
2190 TAY
2200 LDA (zpl),Y
2210 STA ob_char-1,X
2220 LDY #0
2230 :
2240 .open_line
2250 STY temp3
2260 LDA ob_routelo-1,X
2270 STA zpl
2280 LDA ob_routehi-1,X
2290 STA zpl+1
2300 LDY #0
2310 LDA (zpl),Y
2320 CMP #&FF
2330 BNE ol_notahutd
2340 LDY temp1
2350 LDA ob_next-1,X
2360 STA ob_next-1,Y
2370 LDA ob_del_root
2380 STA ob_next-1,X
2390 STX ob_del_root
2400 LDY ob_next-1,Y
2410 SEC
2420 RTS
2430 .ol_notahutd
2440 JSR get_cos

```

```

2450 STA ob_x-1,X
2460 TTY
2470 STA ob_y-1,X
2480 LDY #2
2490 LDA (zpl),Y
2500 CMP #&FF
2510 BNE ol_notfin
2520 LDA #1
2530 STA ob_len-1,X
2540 BNE ol_exit
2550 .ol_notfin
2560 JSR get_cos
2570 STY temp4
2580 LDY #1
2590 SEC
2600 SBC ob_x-1,X
2610 BCS ol_gt1
2620 EOR #&FF
2630 ADC #1
2640 LDY #&FF
2650 .ol_gt1
2660 STA ob_dx-1,X
2670 TTY
2680 STA ob_sl-1,X
2690 LDA temp4
2700 LDY #1
2710 SEC
2720 SBC ob_y-1,X
2730 BCS ol_gt2
2740 EOR #&FF
2750 ADC #1
2760 LDY #&FF
2770 .ol_gt2
2780 STA ob_dy-1,X
2790 TTY
2800 STA ob_s2-1,X
2810 LDA ob_dx-1,X
2820 CMP ob_dy-1,X
2830 LDA ob_dy-1,X
2840 STA ob_dy-1,X
2850 STA ob_dx-1,X
2860 TTY
2870 STA ob_dx-1,X
2880 .ol_noswap
2890 STA ob_len-1,X
2900 LDA #0
2910 ROL A
2920 STA ob_int-1,X
2930 LDA ob_dx-1,X
2940 LSR A
2950 EOR #&FF
2960 SEC
2970 ADC ob_dy-1,X
2980 STA ob_err-1,X
2990 .ol_exit
3000 CLC
3010 LDA ob_routelo-1,X
3020 ADC #2
3030 STA ob_routelo-1,X
3040 LDA ob_routehi-1,X
3050 ADC #0
3060 STA ob_routehi-1,X
3070 LDY temp1
3080 LDA ob_len-1,X
3090 BNE ol_done
3100 JMP open_line
3110 .ol_done
3120 CLC
3130 RTS
3140 :
3150 .get_cos
3160 AND #&7F
3170 STA temp5
3180 LDA (zpl),Y
3190 ORA ob_rel-1,X
3200 STA ob_rel-1,X
3210 RPL gc_notoff
3220 LDA temp5
3230 CLC
3240 ADC ob_offset-1,X
3250 STA temp5
3260 .gc_notoff
3270 INY
3280 LDA (zpl),Y
3290 AND #&7F
3300 TAY
3310 LDA temp5
3320 RTS
3330 :
3340 .run_objs
3350 LDY #0
3360 LDY ob_act_root
3370 BEQ ro_exit
3380 .ro_loop1
3390 DEC ob_len-1,X
3400 BNE ro_notdone
3410 JSR open_line
3420 BCS ro_check
3430 BCC ro_nextobj
3440 .ro_notdone
3450 JSR step_point
3460 .ro_nextobj
3470 TTY
3480 TAY
3490 LDY ob_next-1,Y
3500 .ro_check
3510 BNE ro_loop1
3520 .ro_exit
3530 RTS
3540 :
3550 .step_point
3560 LDA ob_err-1,X
3570 BMI stp_nextbit
3580 SEC
3590 SBC ob_dx-1,X
3600 STA ob_err-1,X
3610 LDA ob_int-1,X
3620 BNE stp_int1
3630 CLC
3640 LDA ob_x-1,X
3650 ADC ob_sl-1,X
3660 STA ob_x-1,X
3670 JMP stp_nextbit
3680 .stp_int1
3690 CLC

```

```

3700 LDA ob_y-1,X
3710 ADC ob_s2-1,X
3720 STA ob_y-1,X
3730 .stp_nextbit
3740 CLC
3750 LDA ob_err-1,X
3760 ADC ob_dy-1,X
3770 STA ob_err-1,X
3780 LDA ob_int-1,X
3790 BNE stp_int2
3800 CLC
3810 LDA ob_y-1,X
3820 ADC ob_s2-1,X
3830 STA ob_y-1,X
3840 RTS
3850 .stp_int2
3860 CLC
3870 LDA ob_x-1,X
3880 ADC ob_sl-1,X
3890 STA ob_x-1,X
3900 RTS
3910 :
3920 .theend
3930 :
3940 P%:=data%
3950 OPT opt%
3960 .pr_root EQU 0
3970 .pr_next OPT FNDs(maxprogs%)
3980 .pr_wait OPT FNDs(maxprogs%)
3990 .pr_delay OPT FNDs(maxprogs%)
4000 .pr_dir OPT FNDs(maxprogs%)
4010 .pr_len OPT FNDs(maxprogs%)
4020 .pr_char OPT FNDs(maxprogs%)
4030 .pr_strio OPT FNDs(maxprogs%)
4040 .pr_strih OPT FNDs(maxprogs%)
4050 .pr_routelo OPT FNDs(maxprogs%)
4060 .pr_routehi OPT FNDs(maxprogs%)
4070 :
4080 .ob_del_root EQU 0
4090 .ob_act_root EQU 0
4100 .ob_next OPT FNDs(maxobj%)
4110 .ob_lastx OPT FNDs(maxobj%)
4120 .ob_lasty OPT FNDs(maxobj%)
4130 .ob_x OPT FNDs(maxobj%)
4140 .ob_y OPT FNDs(maxobj%)
4150 .ob_char OPT FNDs(maxobj%)
4160 .ob_err OPT FNDs(maxobj%)
4170 .ob_dx OPT FNDs(maxobj%)
4180 .ob_dy OPT FNDs(maxobj%)
4190 .ob_sl OPT FNDs(maxobj%)
4200 .ob_s2 OPT FNDs(maxobj%)
4210 .ob_int OPT FNDs(maxobj%)
4220 .ob_len OPT FNDs(maxobj%)
4230 .ob_rel OPT FNDs(maxobj%)
4240 .ob_offset OPT FNDs(maxobj%)
4250 .ob_routelo OPT FNDs(maxobj%)
4260 .ob_routehi OPT FNDs(maxobj%)
4270 :
4280 .temp1 EQU 0
4290 .temp2 EQU 0
4300 .temp3 EQU 0
4310 .temp4 EQU 0
4320 .temp5 EQU 0
4330 :
4340 NEXT
4350 ENDPROC
4360 :
4370 DEF FNDs(space%)
4380 P%:=P%+space%:O%:=O%+space%
4390 .opt%
4400 :
4410 DEF PROCcheck
4420 total%:=0
4430 FOR a%:=mem% TO mem%+theend-runanin
-1
4440 total%:=total%+a%
4450 NEXT
4460 IF total%<>72204 PRINT"Checksum er
ror"VDU7:END
4470 ENDPROC

```

Listing Info2

```

10 REM >CDemo (Info2)
20 REM By Andrew Bennett
30 REM For 8-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE7
70 VDU 23,1,0;0;0;0;
80 *LOAD CCode
90 PROCSetup
100 PROCfrontpage
110 REPEAT UNTIL GET=32
120 PROCdemopage
130 REPEAT UNTIL GET=32
140 PROCendpage
150 REPEAT UNTIL GET=32
160 CLS
170 END
180 :
190 DEF PROCSetup
200 total%:=0
210 READ items%
220 DIM data%:s500,po%(items%-1)
230 a%:=data%
240 FOR i%:=0 TO items%-1
250 go%(i%):=a%
260 READ progs%
270 ?a%:=progs%
280 total%:=total%+progs%
290 b%:=a%+1:a%:=a%+2*progs%+1
300 FOR j%:=0 TO progs%-1
310 ?b%:=a%:b%?1:=a% DIV 256
320 b%:=b%+2
330 REPEAT
340 READ data%
350 FOR k%:=1 TO LEN data%:1 STEP 2
?a%:=EVAL("$(MID$(data%,k%,2))")
370 total%:=total%+?a%
380 a%:=a%+1
390 NEXT
400 UNTIL data%="FF"
410 NEXT

```



```

420 NEXT
430 IF total<>57875 PRINT"Checks sum er
ror - check data statements":VDU7:END
440 ENDPROC
450 :
460 DEF PROCgo(g%)
470 X%=go(g%):Y%=go(g%) DIV 256
480 CALL 4900
490 ENDPROC
500 :
510 DEF PROCfrontpage
520 CLS
530 PRINTTAB(0,10)CHR$(141)
540 PRINTTAB(0,11)CHR$(141)
550 PRINTTAB(0,13)CHR$(141)
560 PRINTTAB(0,14)CHR$(141)
570 PROCgo(0):PROCgo(1)
580 PROCgo(2)
590 ENDPROC
600 :
610 DEF PROCdemopage
620 CLS
630 PRINTTAB(0,1)CHR$(141)
640 PRINTTAB(0,2)CHR$(141)
650 PROCgo(3):PROCgo(4)
660 PROCgo(5):PROCgo(6)
670 PROCgo(7):PROCgo(8)
680 PROCgo(9):PROCgo(10)
690 PROCgo(11):PROCgo(12)
700 PROCgo(13)
710 ENDPROC
720 :
730 DEF PROCendpage
740 CLS
750 PROCgo(14):PROCgo(15)
760 PROCgo(16):PROCgo(17)
770 PROCgo(18):PROCgo(19)
780 ENDPROC
790 :
800 DATA 20
810 :
820 DATA 4
830 DATA 0008FF05436861726100
840 DATA 008F0A
850 DATA FF
860 DATA 08080104637465727200
870 DATA 940A
880 DATA FF
890 DATA 0008FF05436861726100
900 DATA 158F0B
910 DATA FF
920 DATA 08080104637465727215
930 DATA 940B
940 DATA FF
950 :
960 DATA 2
970 DATA 0004010B447968616869
980 DATA 5D61746F722703090307
990 DATA 05070609081D081F0A1F
1000 DATA 0B100D8E0D
1010 DATA FF
1020 DATA 0004FF0B447968616869
1030 DATA 5D61746F722703090307
1040 DATA 161F151D130913071107
1050 DATA 1009088E0E
1060 DATA FF
1070 :
1080 DATA 2
1090 DATA 0004FF0B507265737320
1100 DATA 53504143452010E0108
1110 DATA 02050403060109011003
1120 DATA 1305158816
1130 DATA FF
1140 DATA 0004010B447968616869
1150 DATA 74696E7565000118011E
1160 DATA 02210423065509251023
1170 DATA 1321159416
1180 DATA FF
1190 :
1200 DATA 1
1210 DATA 00080115436861726163
1220 DATA 7465722047968616869
1230 DATA 5D61746F7226181F171D
1240 DATA 151D12C0F1A0C140B0F
1250 DATA 0C0F0B1311141310150C
1260 DATA 140D11150D180A180716
1270 DATA 0512051806F08110A13
1280 DATA 0A14098902
1290 DATA FF
1300 :
1310 DATA 2
1320 DATA 0804FF09436861726163
1330 DATA 74657200008901
1340 DATA FF
1350 DATA 0004010B447968616869
1360 DATA 5D61746F7227009301
1370 DATA FF
1380 :
1390 DATA 1
1400 DATA 00020122576974682020
1410 DATA 74686520204368617261
1420 DATA 6374657220204796861
1430 DATA 68696D61746F7220C8318
1440 DATA 0305
1450 DATA FF
1460 :
1470 DATA 1
1480 DATA 0002FF226D6573736167
1490 DATA 65732063616E2074616B
1500 DATA 6520206F6E20206512020
1510 DATA 6C69666520206F6668318
1520 DATA 0306
1530 DATA FF
1540 :
1550 DATA 1
1560 DATA 00020117746865697220
1570 DATA 677682820466722065
1580 DATA 7861670706C653A831803
1590 DATA 07
1600 DATA FF
1610 :
1620 DATA 1
1630 DATA 0010010A53696E652057
1640 DATA 617665732710250C230A
1650 DATA 220A200C1C141A161916
1660 DATA 1714130C110A850A
1670 DATA FF
1680 :
1690 DATA 1

```

```

1700 DATA 0010010743697263065
1710 DATA 73270D190D160E150F14
1720 DATA 1115131614191518151E
1730 DATA 141F1320111F0F1B0E1B
1740 DATA 0D850D
1750 DATA FF
1760 :
1770 DATA 1
1780 DATA 00100107537175617265
1790 DATA 7327120F120F19181818
1800 DATA 0A210A2110B510
1810 DATA FF
1820 :
1830 DATA 3
1840 DATA 00040108496820666163
1850 DATA 742C2712940C
1860 DATA FF
1870 DATA 0804010F616E79746869
1880 DATA 6E672020697320206127
1890 DATA 12940D
1900 DATA FF
1910 DATA 1004010C706F73736962
1920 DATA 696C6974792E2712940E
1930 DATA FF
1940 :
1950 DATA 1
1960 DATA 3210FF0F0616C6D6F7374
1970 DATA 27140413031203100A0F
1980 DATA 0C0E100B140A1B0A3D0C
1990 DATA FF
2000 :
2010 DATA 2
2020 DATA 0004010B507265737320
2030 DATA 535041434500080E0812
2040 DATA 09130A13118815
2050 DATA FF
2060 DATA 0004FF0B746F72063F6E
2070 DATA 74696E75652708180E14
2080 DATA 09130A13119415
2090 DATA FF
2100 :
2110 DATA 2
2120 DATA 0008010F2A2020202A20
2130 DATA 20202A202A2A2A2A13
2140 DATA 1813031202830B
2150 DATA FF
2160 DATA 0008FF102A2A2A2A2A2A
2170 DATA 2A2020202A2A2A2A2A
2180 DATA 141814031502960B
2190 DATA FF
2200 :
2210 DATA 2
2220 DATA 0008010B2A2020202A20
2230 DATA 20202A202A1318130312
2240 DATA 02830A
2250 DATA FF
2260 DATA 0008FF112A2020202020
2270 DATA 2A20202A2A2A2A202020
2280 DATA 2A141814031502960A
2290 DATA FF
2300 :
2310 DATA 2
2320 DATA 0008010E2A2020202A2A
2330 DATA 2A2A2A202A2A2A2A1318
2340 DATA 13031202830B
2350 DATA FF
2360 DATA 0008FF112A2A2A2A2020
2370 DATA 2A202A202A2A202020
2380 DATA 2A1418140315029609
2390 DATA FF
2400 :
2410 DATA 2
2420 DATA 0008010B2A2020202A20
2430 DATA 20202A202A1318130312
2440 DATA 028308
2450 DATA FF
2460 DATA 0008FF112A2020202020
2470 DATA 2A2A20202A2A202020
2480 DATA 2A1418140315029608
2490 DATA FF
2500 :
2510 DATA 2
2520 DATA 000801112A2A2A2A2A20
2530 DATA 2A2020202A202A2A2A2A
2540 DATA 2A1318130312028107
2550 DATA FF
2560 DATA 0008FF102A2A2A2A2A20
2570 DATA 2A2020202A2A2A2A2A2A
2580 DATA 1418140315029607
2590 DATA FF
2600 :
2610 DATA 1
2620 DATA 0004FF15507265737320
2630 DATA 535041434520746F72066
2640 DATA 696E697368270D080E13
2650 DATA 0F001013110012131300
2660 DATA 140915
2670 DATA FF

```

Listing Info3

```

10 REM >CDexamp (Info3)
20 REM By Andrew Bennett
30 REM For 8-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 7
70 *LOAD CDcode
80 DIM anim% &100
90 FOR opt%=0 TO 2 STEP 2
100 P%-anim%:[OPT opt%
110 EQU2 2 \ Number of programs
120 EQUW prog1 \ Pointer to program
130 EQUW prog2 \ Pointer to program
140 :
150 : prog1 \ Program 1
160 EQU2 0 \ Initial delay (/50
seconds)
170 EQU2 4 \ Subsequent delay (/
50 seconds)
180 EQU2 1 \ Direction
190 EQU2 9 \ String length
200 EQU2 "Character" \ String
210 EQU2 20 \ First X coordinate
220 EQU2 0 \ First Y coordinate
230 EQU2 128+10 \ Second X coordinate
and add in offset

```

```

240 EQU2 12 \ Second Y coordinate
250 EQU2 &FF \ End of path and pro
gram
260 :
270 : prog2 \ Program 2
280 EQU2 0
290 EQU2 4
300 EQU2 &FF
310 EQU2 11
320 EQU2 "Dynamimator"
330 EQU2 20
340 EQU2 0
350 EQU2 128+20
360 EQU2 12
370 EQU2 &FF
380 :
390 NEXT
400 X%-anim%:Y%-anim% DIV 256
410 CALL 4900
420 PRINT
430 END

```

Listing Info4

```

10 REM >CDex2 (Info4)
20 REM By Dave Acton
30 REM For 8-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 7
70 FOR y%=0 TO 24
80 VDU 31,0,y%,129+y% MOD 6
90 NEXT
100 *LOAD CDcode
110 DIM anim% &200
120 s%:=30
130 FOR pass%=0 TO 2 STEP 2
140 P%-anim%
150 [OPT pass%
160 EQU2 3
170 EQUW prog1
180 EQUW prog2
190 EQUW prog3
200 :
210 : prog1
220 EQU2 0
230 EQU2 2
240 EQU2 1
250 EQU2 3
260 EQU2 "BBC"
270 :
280 PROCrand_path(13,0)
290 [OPT pass%
300 : prog2
310 EQU2 20
320 EQU2 2
330 EQU2 1
340 EQU2 5
350 EQU2 "Acorn"
360 :
370 PROCrand_path(17,1)
380 [OPT pass%
390 : prog3
400 EQU2 40
410 EQU2 2
420 EQU2 1
430 EQU2 4
440 EQU2 "User"
450 :
460 PROCrand_path(23,2)
470 NEXT pass%
480 X%-anim%:Y%-anim% DIV 256
490 CALL 4900
500 END
510 :
520 DEF PROCrand_path(finalx%,yoff%)
530 x%:=1
540 FOR y%=20 TO 10 STEP -2
550 P%70=x%
560 P%11=y%-yoff%
570 REPEAT
580 x%=RND(39)
590 UNTIL y%<12 OR x%=finalx%+10
600 IF y%=10 x%=128+finalx%
610 P%72=x%
620 P%73=y%-yoff%
630 P%-P%+4
640 NEXT
650 P%&=FF
660 P%-P%+1
670 ENDPROC

```

Listing Info5

```

10 REM >FMDModAm (Info5)
20 REM By Simon Heys
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 0
70 dirlist$="DirList"
80 SYS "OS_File",5,dirlist$ TO type%,
,,,room%
90 IF type%<1 ERROR 0,"Can't find "+
dirlist$
100 croom%=room%+1024
110 DIM code% croom%
120 sp%13:link=14:pc=15
130 FOR pass%=4 TO 6 STEP 2
140 P%-0:0%code%
150 [OPT pass%
160 EQU2 0
170 EQU2 0
180 EQU2 0
190 EQU2 0
200 EQU2 title
210 EQU2 helptext
220 EQU2 helptable
230 EQU2 0
240 EQU2 0
250 EQU2 0
260 EQU2 0
270 :
280 :title
290 EQU2 "DirectoryFinder"
300 EQU2 0
310 ALIGN
320 :
330 :helpstring

```

```

340 EQU2 "DirectoryFinder"
350 EQU2 9
360 EQU2 "1.02 (29 Jul 1992
) by Simon Heys"
370 EQU2 0
380 ALIGN
390 :
400 :helptable
410 EQU2 "FD"
420 EQU2 0
430 ALIGN
440 EQU2 finddir
450 EQU2 400010001
460 EQU2 fdsyntax
470 EQU2 fdhelp
480 EQU2 0
490 :
500 :fdhelp
510 EQU2 "FD changes direc
tory to one with the
specified prefix."
520 EQU2 13
530 EQU2 10
540 :fdsyntax
550 EQU2 "Syntax: *FD <Dir
name>Dir name prefix>"
560 EQU2 0
570 ALIGN
580 :
590 :finddir
600 LDR r12,[r12]
610 STMFD (sp!),(r0-r3,r14)
620 MOV r1,#0
630 ADR r3,s
640 :getloop
650 LDRB r2,[r0],#1
660 CMP r2,#ASC "a"
670 BLT upper
680 CMP r2,#ASC "z"
690 BGT upper
700 AND r2,r2,#223
710 :upper
720 STRB r2,[r3],#1
730 ADD r1,r1,#1
740 CMP r2,#32
750 BGT getloop
760 :
770 MOV r0,#0
780 SUB r1,r1,#1
790 SUB r3,r3,#1
800 STRB r0,[r3]
810 BL find
820 BL
830 LDMFD (sp!),(r0-r3,pc)
840 :
850 :s EQU2 STRING$(11,CHR$(0))
860 :l EQU2 0
870 ALIGN
880 :
890 :find
900 STMFD (sp!),(r0-r6,r14)
910 ADR r0,data
920 ADR r1,s
930 LDRB r6,r1
940 :loop1
950 LDRB r3,[r0],#1
960 CMP r3,#255
970 BEQ notfound
980 CMP r3,#ASC"a"
990 BNE loop1
1000 MOV r4,#1
1010 MOV r5,#0
1020 :checkloop
1030 LDRB r2,[r1,r5]
1040 LDRB r3,[r0],#1
1050 CMP r3,#255
1060 BEQ notfound
1070 CMP r3,#ASC"a"
1080 BLT up
1090 CMP r3,#ASC"z"
1100 BGT up
1110 AND r3,r3,#223
1120 :up
1130 CMP r3,r2
1140 BNE loop1
1150 ADD r5,r5,#1
1160 CMP r5,r6
1170 BLT checkloop
1180 SUB r0,r0,#1
1190 :loop2
1200 LDRB r3,[r0],#1
1210 CMP r3,#0
1220 BNE loop2
1230 ADD r0,r0,#2
1240 MOV r1,r0
1250 SWI "OS_WriteS"
1260 EQU2 CHR$(10)+"Director
y: "+CHR$(0)
1280 ALIGN
1290 SWI "OS_Write0"
1300 SWI 256+10:SWI 256+13
1310 MOV r0,#0
1320 SWI "OS_FSControl"
1330 LDMFD (sp!),(r0-r6,pc)
1340 :
1350 :notfound
1360 SWI "OS_WriteS"
1370 EQU2 CHR$(10)+"Can't fi
nd "+CHR$(0)
1380 ADR r0,s
1390 SWI "OS_Write0"
1400 SWI "OS_WriteS"
1410 EQU2 " in directory li
st "+CHR$(10)+CHR$(13)+CHR$(0)
1420 ALIGN
1430 LDMFD (sp!),(r0-r6,pc)
1440 :
1450 :data
1460 :
1470 0%+=room%
1480 NEXT
1490 :
1500 SYS "OS_File",255,dirlist$,code%+d
ata
1510 SYS "OS_File",10,"FMDMod",FFFA,,cod
e%,0%
1520 PRINT"Module saved as 'FMDMod'"
1530 END

```



```

430 C%<=ND(50)+5
440 D%=(D%+1)MOD320
440 CALL startup
450 MOUSE X,Y,Z
460 IF Z AND 1 GCOL%TINT%:CIRCLEFILLX
,y,96:GCOLORND(64):TINTRND(256)
470 IF Z AND 4 CIRCLE FILLX,Y,6
480 IF Z AND 2 GCOLRND(64):TINTRND(256)
)
490 UNTIL FALSE
500 ENDPROC
510 :
520 DEF PROCwipe
530 C%<=0
540 T%<=0
550 FOR x=0 TO 12 STEP 4
560 FOR y=0 TO 1023 STEP 4
570 T%+=16
580 GCOL C% TINT T%
590 IF T%>255 T%<=0:C%+=1:IF C%>63 C%
=0
600 POINT x,y
610 NEXT
620 NEXT
630 FOR x=16 TO 1280 STEP 16
640 RECTANGLE 0,0,16,1024 TO x,y
650 NEXT
660 ENDPROC
670 :
680 DEF PROCdots
690 C%<=0:T%<=0
700 FOR n=1 TO 50
710 GCOL RND(64) TINT RND(256)
720 POINT RND(1280),RND(1024)
730 NEXT
740 ENDPROC
750 :
760 DEF PROCgrid
770 C%<=RND(80)+10
780 c%<=0
790 FOR x=0 TO 1280 STEP g%
800 FOR y=16 TO 1007 STEP g%
810 c%+=1:IF c%>63 c%+=1
820 GCOL c%
830 POINT x,y
840 NEXT
850 NEXT
860 ENDPROC
870 :
880 DEF PROClines
890 FOR n=0 TO 30
900 GCOL RND(64):TINTRND(256)
910 LINE RND(1280),RND(1024),RND(1280
),RND(1024)
920 NEXT
930 ENDPROC
940 :
950 DEF PROCgrow
960 REPEAT
970 C%<=RND(50)+10
980 D%=(D%+1)MOD320
990 CALL startup
1000 UNTIL 0
1010 ENDPROC
1020 :
1030 DEF PROCcode
1040 DIM code2% 1500
1050 link=14:pc=15
1060 top=11
1070 rnd1=3
1080 temp=5
1090 point=6
1100 colour=7
1110 point2=8
1120 return=9
1130 rnd2=2
1140 tint=10
1150 FORpass%<=0TO2STEP2
1160 P%<=code2%
1170 OPTpass%
1180 .vdu
1190 EQUID 148
1200 EQUID -1
1210 .vdu2
1220 EQUID 0
1230 .init
1240 ADR 0,.vdu
1250 ADR 1,.vdu
1260 SWI "OS_ReadVduVariables"
1270 LDR point,.vdu
1280 ADD top,point,*81920
1290 SUB top,top,*640
1300 STR top,vdu2
1310 ADD point,point,*320
1320 STR point,.vdu
1330 MOV rnd1,#1
1340 MOV pc,link
1350 .startup
1360 MOV return,link
1370 LDR point,.vdu
1380 LDR top,vdu2
1390 ADD point,point,rnd1
1400 .loop
1410 ADD point,point,rnd2
1420 LDRB colour,[point]
1430 MOV colour,colour,LSR#2
1440 CMP colour,#0
1450 BLNE direct
1460 ADDNE colour,tint,colour,LSL#2
1470 STRNEB colour,[point2]
1480 CMP point,top
1490 BLT loop
1500 MOV pc,return
1510 .direct
1520 SUBS tint,tint,#1
1530 MOVLTL tint,#3
1540 MOV point2,point
1550 LDRB temp,[point2,#1]:
1560 CMP colour,temp,LSR#2
1570 MOVNE pc,link
1580 LDRB temp,[point2,#-2]:
1590 CMP colour,temp,LSR#2
1600 MOVNE pc,link
1610 LDRB temp,[point2,#321]:
1620 CMP colour,temp,LSR#2
1630 MOVNE pc,link
1640 LDRB temp,[point2,#-640]:
1650 CMP colour,temp,LSR#2
1660 MOV pc,link

```

```

6770 INEXTpass%
1680 ENDPDPROC

Listing Info11

10 REM >Distort (Infol1)
20 REM By David Jeffries
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 15
70 DIM sprite 162*1024
80 "Cat
90 INPUT "Sprite file : "spr$
100 INPUT "Radius : "radius
110 "OS File",&FF,spr$,sprite
120 PROCmakeshape
130 PRINT "Mouse control : "
140 mcs(INSTR(" YyWw",GET$(DIV2=1)
150 IF mcs PRINT"Yes" ELSE PRINT"No"
160 PROCAssembler
170 CLS:OFF
180 CALLCode
190 END
200 :
210 DEF PROCAssembler
220 DIM code 1000
230 FOR pass=0 TO 2 STEP2
240 P=code
250 OPT pass
260 MOV R0,#0
270 LDR R7,pos
280 LDR R8,coord2
290 LDR R9,coord1
300 LDR R10,scstart
310 LDR R11,image
320 LDR R12,length
330 SUB R11,R11,R12
340 SUB R10,R10,R12
350 ADD R10,R10,R7
360 LDR R4,end
370 ADD R4,R4,R9
380 .inloop
390 LDR R8,coord2
400 LDR R9,coord1
410 .loop
420 LDR R2,[R8],#4
430 ADD R3,R11,R7
440 ADD R2,R2,R3
450 LDR R2,[R2]
460 LDR R1,[R9],#4
470 ADD R1,R1,R10
480 STR R2,[R1]
490 STR R2,[R1,#4]
500 STR R2,[R1,#8]
510 STR R2,[R1,#640]
520 STR R2,[R1,#644]
530 STR R2,[R1,#648]
540 STR R2,[R1,#1280]
550 STR R2,[R1,#1284]
560 STR R2,[R1,#1288]
570 STR R2,[R1,#12920]
580 STR R2,[R1,#1524]
590 STR R2,[R1,#1528]
600 CMP R9,R4
610 BLT loop
620 LDR R8,mouse
630 CMP R8,#0
640 ADDEQ R7,R7,#4
650 BEQ nomouse
660 ADR R8,buf
670 STIA R8,[r0-r1,R4-R7,R9-R12]
680 SWI "OS Mouse"
690 LDR R4,oldx
700 SUB R2,R0,R4
710 STR R0,oldx
720 ADR R8,buf
730 LDMA R8,[r0-r1,R4-R7,R9-R12]
740 SUB R7,R7,R2
750 .nomouse
760 MOV R0,#0
770 SWI "OS_ReadEscapeState"
780 BCC inloop
790 MOV PC,R14
800 :
810 .coord1 EQUd data1+8
820 .coord2 EQUd data2
830 .scstart EQUd 148
840 EQUd -1
850 .image EQUd sprite+sprite144
860 .length EQUd 628000 DIV 2
870 .end EQUd 1data1
880 .pos EQUd 320
890 .oldx EQUd 640
900 .mouse EQUd ABSmc
910 .buf
920 ]:NEXT
930 SYS "OS_ReadVduVariables",scstart,
scstart
940 ENDPDPROC
950 :
960 DEF PROCmakeshape
970 PRINT
980 size=(radius/4)^2*512
990 DIM data1 size,data2 size
1000 counter=0
1010 r1:r2=1:c=0.1
1020 REPEAT
1030 FOR a=0 TO PI*2 STEP PI/(r/4)
1040 x=r*cosa:y=r*sin:a:x2=r2*cosa:y2=
r2*sin:a
1050 addr1=628000-(640*INT(y/4))+x/2
1060 addr2=628000-(640*INT(y/2/4))+x/2
1070 data1=counter+addr1
1080 data2=counter+addr2
1090 counter+=4
1100 NEXT
1110 r+=16
1120 c+=(SIN(PI/2)*(r/radius))
1130 r2+=4*c
1140 PRINT "Please wait :";(radius>
r?"(r-radius)":"CHR$13);
1150 UNTIL r>radius
1160 1data1=(counter-SQR(counter))
1170 1data2=(data2-data1)
1180 PRINT
1190 ENDPDPROC

```

Listing Info12

```

10 REM      >Bell7/1 (Info2)
20 REM BY Dave Lawrence
30 REM For All machines
40 REM (C) BAU June 1993
50 :
60 INPUT c$,w:DIM s,q:8$=STRING$
(2,1)2uq4i5a6f7U8L9DQqE8B70 *):h$=4:c
=1:REPEAT2-2:u=d:INSTR(c$,s):c:=FORI=1
OB*2STEP2:u=1:VDU9,n?j:SOUND1,-15,n?1
WID2:WID=INKEY("w5"),h?j:INSTR(MID$(c$,c,d-
c),CHR$(h?j)):g$=AND(INKEY$TRUE,OR:NEXT:c
=d-1-2:REPEAT2-1-2:q=1:n?j:q14=q$g$-g$
/h?h?h?j):n?j:q$=1-2$=UNTIL14=b*2:WID
THINKY("w"):PRINT:VDU$=UNTIL0

```

Listing Info13

```

10 REM      >IceTrain/1 (Infol3)
20 REM By Richard Wilkie
30 REM For All machines
40 REM (c) BAU June 1993
50
60 MODE 12:OFF:A=0:FOR B=1TO903STEP0.
1:A=A+1:X=640:GOSUB(1):B=Y+52:CSRAD(A)
*B=G+A*MOD5:INCOLL,G+=1:CIRCLEFILL X,Y,10
0:NEXT:REPEAT:A+=1:A=MOD 15:FOR B=1TO1
5:COLOUR B,(A+B)*16,0,0:NEXT:UNTIL 0

```

Listing Info14

```

10 REM      >Orblet/1 (Inf014)
20 REM By   Robbie Davies
30 REM For 32-bit machines
40 REM (C)  BAU June 1993
50 :
60 MODELS=GC0L3,59:D=32:T=30:DIMD(4):
REPEATS=5:MODL1=X+D:CIRCLEX,99,32:RSC
TANGLEFILL,RND(800),992,99,-(RND(T)-1)*32
:MOUSEE,P,L,B:WAIT:CIRCEP,32:PRINTBAS
(0,S-1)CHR$1:D=-2:D(2)=D(1)=-D(D/4)-
X*4!*20:D=D((X+0)-1):X=X*(X0)*T=-.01:U
NT$PRINT(X,92):-5000000*3

```

Listing Info15

```

10 REM      >Tune/1 (Info15)
20 REM By  Robbie Davies
30 REM For 32-bit machines
40 REM (C) BAU June 1993
50 :
60 VOICES4:FORI=1T04:OSCLI("Channel,
*8STR$1+ " 2"):NEXT:DIV3(3):B$="047772904
4759872047772":FORO=REPEATFOR1T024STATE
P3:FORO2T03:V(V)=VALMID$(B$,V+1,1):NEXT
:FORI=1T08:FORO=O2T02: SOUNDN=1+,-V(N)*4:
(N)*0*-48,9,NEXT: SOUNDN,R,V(INT(1/I)/2)
-1)+4*96,9:A=INKEYT3:NEXT,R:R=UNTIL0

```

Listing Info16

```

10 REM %Lives3(2) (Info6)
20 REM Life for two challenge
30 REM By Dave Acton
40 REM For 32-bit machines
50 REM (c) BAU June 1993
60 :
70 MODE 9
80 OFF
90 size%=5
100 max%=255
110 max_turn%=100
120 time_limit%=18000
130 DIM proc$(max%), file$(max%), score(
max%), seen$(max%), player$(max%)
140 DIM c%(2), board$, size%, size%+1,
size%+size%, games(2), who$(2), time_left%
150
160 DIM temp$, @1000, str$ @100
170 SYS "OS GBRP", 9, "procs", temp$, 256,
0, @1000, "" TO ,, players%
170 p%=temp$
180 FOR i%=0 TO players%-1
190 p2%=p%
200 WHILE ?p2%<0
210 p2%+=1
220 ENDWHILE
230 ?p2%=13
240 player$(i%)=LEFT$(?p%+STRING$(10,
" ",1),10)
250 proc$(i%)=FNic(?p%)
260 file$(i%)="procs."+proc$(i%)
270 p%=p2%+1
280 NEXT
290 OVERLAY file$(i)
300 to_play=i%
310 score(i)=0
320 display%=TRUE
330 FOR i%=0 TO players%-1
340 dummy%=EVAL("FN"+proc$(i%)+"(0,0,
-1,size%,0,0)")
350 NEXT
360 FOR who%(1)=0 TO players%-2
370 FOR who%(2)=who%(1)+1 TO players%-1
380 game(i)=0
390 first%=1
400 last%=2
410 FOR game%=1 TO to_play%
420 PROCcentre%! (for two challen
nge,0,7)
430 PRINTBA(0,2)$PC40
440 PROCcentre(proc$(who%(1))+"" vs
""+proc$(who%(2)),2,5)
450 PROCGames won
460 FOR i%=0 TO size%+size%-1
470 board%i=i%+0
480 NEXT
490 PROCshow_board
500 turn%=1
510 game_over%=FALSE
520 foul%=1
530 time_left%=(time_limit%
REPEAT
540 IF turn%=3 PROCLife
550 IF ?Ncount(1)>0 AND FNcount(2)
>0),0 OR turn%<& TURN

```

```

570 FOR player=first TO last% S
575 SGN(last%-first%)
580 PROCturn(player%,turn%)
590 NEXT
600 turn%+=1
610 ELSE
620 game_over%=TRUE
630 ENDF
640 PROCshow_board
650 g%:=INKEY$(0)
660 IF g%="D" OR g%="d" display%+=N
OT display%
670 IF turn%=max_turn% game_over%=
TRUE
680 UNTIL game_over% OR foul%+=1
690 IF foul%+=1 THEN
700 COLOUR 1
710 PRINTTAB(0,18)CHR$77:Foul by "p
roc$(who$(foul%))SPC10
720 games(3-foul%)+=1
730 wait=INKEY$(200)
740 PRINTTAB(0,18)SPC10
750 ELSE
760 FOR player%=1 TO 2
770 games(player%)+=(1+SGN(FNcount
(player%)-FNcount(3-player%)))/2
780 NEXT
790 ENDIF
800 PROCgames_won
810 SWAP first%,last%
820 NEXT
830 FOR player%=1 TO 2
840 score(who$(player%))+=games(pla
yer%)
850 NEXT
860 PROChigh_score
870 NEXT
880 NEXT
890 END
900 :
910 DEF FNcount(player%)
920 LOCAL x%,y%,i%,k%
1000 FOR x%=0 TO size%-1
1010 FOR y%=0 TO size%-1
1020 k%:=x%*size%+y%
1030 new%k%:=board%y%k%
1040 c%(1)=0
1050 c%(2)=0
1060 FOR xx%=1 TO 1
1070 FOR yy%=1 TO 1
1080 c%(FNcell(x%+xx%,y%+yy%))+=1
1090 NEXT
1100 NEXT
1110 c%(FNcell(x%,y%))-=1
1120 IF board%y%k%=0 THEN
1130 IF c%(1)+c%(2)=3 THEN
1140 IF c%(1)+c%(2) THEN new%k%:=1
ELSE new%k%:=2
1150 ENDF
1160 ELSE
1170 IF c%(1)+c%(2)+2 OR c%(1)+c%(2)
>3 THEN new%k%:=0
1180 ENDF
1190 NEXT
1200 NEXT
1210 FOR i%=0 TO size%*size%-1
1220 board%y%:=new%y%i
1230 NEXT
1240 PROCshow_board
1250 ENDFPROC
1260 :
1270 DEF FNcell(x%,y%)
1280 =board%?(x%*size%)+
size%*(y%*size%+size%)
1290 :
1300 DEF PROCshow_board
1310 IF NOT display% ENDFPROC
1320 FOR i%=0 TO size%*size%-1
1330 PROCshow_square(i%)
1340 NEXT
1350 ENDFPROC
1360 ENDFPROC
1370 :
1380 DEF PROCshow_square(i%)
1390 LOCAL x%,y%
1400 x%:=i% MOD size%
1410 y%:=i% DIV size%
1420 COL 7
1430 RECTANGLE x%*64,y%*64,64,64
1440 COL board%y%x%
1450 CIRCLE FILL x%*64+32,y%*64+32,24
1460 ENDFPROC
1470 :
1480 DEF PROCcentre(t$,y%,c%)
1490 COLOUR c%
1500 PRINTTAB(20-LENT$(2,y%))t$
1510 ENDFPROC
1520 :
1530 DEF PROCgames_won
1540 COLOUR 3
1550 PRINTTAB(0,5)"Games"
1560 COLOUR 2
1570 FOR player%=1 TO 2
1580 LOCAL i%,j%,h%,best
1590 PRINTTAB(20,5)"Top scores"
1600 COLOUR 2
1610 seen%()=FALSE
1700 FOR i%=1 TO players%
1710 hi=-1
1720 FOR j%=0 TO player%-1
1730 IF NOT seen%(j%) AND score(j%)>

```



```

1 hi=score(%):best=%
1740 NEXT
1750 seen%(best)=TRUE
1760 PRINTTAB(20,6+1%);player$(best);"
: ";score(best);" ";
1770 NEXT
1780 ENDPROC
1790 :
1800 DEF PROCturn(player%,turn%)
1810 LOCAL time%
1820 IF foul%<1 ENDPROC
1830 time%=TIME
1840 where%=EVAL("FN"+proc$(who%(player
%))+"(board%,player%,turn%,size%,first%,
time_left%(player%))")
1850 time_left%(player%)=(TIME-time%)
1860 IF time_left%(player%)<0 foul%=pla
yer%
1870 IF where%<0 OR where%>size%*size%-
1 foul%=player% ELSE IF board%>where%<0
foul%=player%
1880 IF foul%=1 THEN board%>where%pla
yer%:IF display% PROCshow_square(where%)
1890 ENDPROC
1900 :
1910 DEF FNlc(a$)
1920 LOCAL i%
1930 str%=""
1940 FOR i%=0 TO LEN(a$)-1
1950 IF str%?i%="A" AND str%?i%<="a
SC" THEN str%?i%="str%?i%+32
1960 NEXT
1970 str%=""

```

Listing Info17

```

10 REM >Stupid (Info17)
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 DEF FNsimple(board%,player%,turn%,
size%,first%,left%)
70 IF turn%=-1 THEN =0
80 LOCAL best%
90 REPEAT
100 best%=RND(size%*size%)-1
110 UNTIL board%>best%=0
120 =best%

```

Listing Info18

```

10 REM >Simple (Info18)
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 DEF FNsimple(board%,player%,turn%,
size%,first%,left%)
70 LOCAL best_score%,c%(1),x%,y%,k%(1),
xx%,yy%,brd%()
80 IF turn%=-1 THEN =0
90 DIM c%(2),k%(size%+1),size%+1,brd%
(size%+1,size%+1)
100 FOR x%=0 TO size%+1
110 FOR y%=0 TO size%+1
120 brd%(x%,y%)=board%?((x%+size%)-1
MOD size%+size%*((y%+size%)-1 MOD size%
))
130 NEXT
140 NEXT
150 k%(1)=0
160 FOR x%=1 TO size%
170 FOR y%=1 TO size%
180 IF brd%(x%,y%)<0 THEN
190 c%(1)=0
200 FOR xx%=1 TO 1
210 FOR yy%=1 TO 1
220 c%(brd%(x%+xx%,y%+yy%))+1
230 NEXT
240 NEXT
250 c%(brd%(x%,y%))=1
260 IF (c%(1)=1 AND c%(2)=1) OR (c%
(player%)=2 AND c%(3-player%)=0) THEN
270 FOR xx%=1 TO 1
280 FOR yy%=1 TO 1
290 k%(x%+xx%,y%+yy%)+1
300 NEXT
310 NEXT
320 k%(x%,y%)=1
330 ENDIF
340 ELSE
350 k%(x%,y%)=-1000
360 ENDIF
370 NEXT
380 NEXT
390 best_score%=-1
400 FOR x%=1 TO size%
410 FOR y%=1 TO size%
420 IF brd%(x%,y%)<0 AND k%(x%,y%)>0
best_score% best_score%k%(x%,y%)
430 NEXT
440 NEXT
450 REPEAT
460 x%=RND(size%)
470 y%=RND(size%)
480 UNTIL k%(x%,y%)=best_score%
490 =(x%-1)+size%*(y%-1)

```

Listing Info19

```

10 REM >Best (Info19)
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 DEF FNbest(board%,player%,turn%,si
ze%,first%,left%)
70 LOCAL best_score%,c%(1),t%(1),x%,y%,
xx%,yy%,b%(1),try_x%,try_y%
80 IF turn%=-1 DIM best_brd%(size%+1,
size%+1),best_brd2%(size%+1,size%+1):=0
90 DIM c%(2),t%(2),b%(size%,size%)

```

```

100 FOR x%=0 TO size%+1
110 FOR y%=0 TO size%+1
120 best_brd%(x%,y%)=board%?((x%+si
ze%)-1 MOD size%+size%*((y%+size%)-1 MOD
size%))
130 NEXT
140 NEXT
150 best_score%=-9999
160 b%(1)=-10000
170 FOR try_x%=1 TO size%
180 FOR try_y%=1 TO size%
190 IF best_brd%(try_x%,try_y%)<0 TH
EN
200 best_brd2%(1)=best_brd%(1)
210 t%(1)=0
220 best_brd2%(try_x%,try_y%)=playe
r%
230 FOR x%=1 TO size%
240 FOR y%=1 TO size%
250 c%(1)=0
260 FOR xx%=1 TO 1
270 FOR yy%=1 TO 1
280 c%(best_brd2%(x%+xx%,y%+yy%
))+1
290 NEXT
300 NEXT
310 c%(best_brd2%(x%,y%))=1
320 IF best_brd2%(x%,y%)<0 THEN
330 IF c%(1)+c%(2)=3 THEN
340 IF c%(1)>c%(2) THEN t%(1)+
1 ELSE t%(2)+1
350 ENDIF
360 ELSE
370 IF c%(1)+c%(2)=2 OR c%(1)+c%
(2)=3 THEN t%(best_brd2%(x%,y%))+1
380 ENDIF
390 NEXT
400 NEXT
410 b%(try_x%,try_y%)=t%(player%)-t
%(3-player%)
420 IF b%(try_x%,try_y%)>best_score
% best_score%=b%(try_x%,try_y%)
430 ENDIF
440 NEXT
450 NEXT
460 REPEAT
470 x%=RND(size%)
480 y%=RND(size%)
490 UNTIL b%(x%,y%)=best_score%
500 =(x%-1)+size%*(y%-1)

```

Listing Info20

```

10 REM >Lives8 (Info20)
20 REM Life for two challenge
30 REM By Dave Acton
40 REM For 8-bit machines
50 REM (c) BAU June 1993
60 :
70 mode%=5
80 IF mode%=5 THEN x%=128:x%=10 ELS
E x%=64:x%=20
90 MODE mode%
100 VDU 23:8202:0:0:0:19:2:0,0,0
110 VDU 23:224:0:3:15:31:31:63:63
120 VDU 23:225:0:224:248:252:252:254:2
54,254
130 VDU 23:226:63:63:31:31:15:3,0,0
140 VDU 23:227:254,254,252,252,248,224
,0,0
150 piece$=CHR$(224+CHR$(225+CHR$(8-CHR$(
CHR$(10-CHR$(226+CHR$(227
160 size%=5
170 max_turn%=100
180 time_limit%=3*18000
190 DIM proc$(2),file$(2),player$(2)
200 player$(1)="Best"
210 player$(2)="Simple"
220 proc$(1)="best"
230 proc$(2)="simple"
240 DIM c%(2),board% size%*size%,new%
size%*size%,games(2),time_left%(2)
250 to_play%=10
260 FOR i%=1 TO 2
270 dummy%=EVAL("FN"+proc$(i%)+"(0,0,
-1,size%,0,0)")
280 NEXT
290 first%=1
300 last%=2
310 PROCcentre("Life for two",0,7)
320 FOR x%=0 TO size%
330 MOVE x%*xs,0
340 DRAW x%*xs,64*size%
350 MOVE 0,x%*64
360 DRAW x%*size%,x%*64
370 NEXT
380 FOR game%=1 TO to_play%
390 PROCcentre(proc$(1)+ vs "+proc$(
2),2,6)
400 PROCgames_won
410 FOR i%=0 TO size%*size%-1
420 board%?i%=0
430 NEXT
440 PROCshow_board
450 turn%=1
460 game_over%=FALSE
470 foul%=-1
480 time_left%(1)=time_limit%
490 time_left%(2)=time_limit%
500 REPEAT
510 IF turn%>3 PROClife
520 IF (FNcount(1)>0 AND FNcount(2)>
0) OR turn%<4 THEN PROCplay ELSE game_ov
er=TRUE
530 PROCshow_board
540 IF turn%=max_turn% game_over%=TR
UE
550 UNTIL game_over% OR foul%<-1
560 IF foul%<-1 THEN PROCfoul ELSE PR
OCally
570 PROCgames_won
580 temp%=first%
590 first%=last%
600 last%=temp%

```

```

610 NEXT
620 END
630 :
640 DEF PROCfoul
650 COLOUR 1
660 PRINTTAB(0,18)CHR$(7)+"Foul by "proc$
(foul%)SPC10
670 games(3-foul%)+games(3-foul%)+1
680 wait=INKEY(100)
690 PRINTTAB(0,18)SPC10
700 ENDPROC
710 :
720 DEF PROCally
730 FOR player%=1 TO 2
740 games(player%)+games(player%)+(1+
SGN(FNcount(player%)-FNcount(3-player%))
)/2
750 NEXT
760 ENDPROC
770 :
780 DEF PROCplay
790 FOR player%=first% TO last% STEP S
GN(last%-first%)
800 PROCturn(player%,turn%)
810 NEXT
820 turn%=turn%+1
830 ENDPROC
840 :
850 DEF FNcount(player%)
860 LOCAL c%,i%
870 FOR i%=0 TO size%*size%-1
880 IF board%?i%=player% c%=c%+1
890 NEXT
900 =c%
910 :
920 DEF PROClife
930 LOCAL x%,y%,i%,k%,c%
940 FOR x%=0 TO size%-1
950 FOR y%=0 TO size%-1
960 k%=x%+size%*y%
970 new%?k%=board%?k%
980 c%(1)=0
990 c%(2)=0
1000 FOR xx%=-1 TO 1
1010 FOR yy%=-1 TO 1
1020 c%=FNcell(x%+xx%,y%+yy%)
1030 c%(c%)+c%(c%)+1
1040 NEXT
1050 NEXT
1060 c%=FNcell(x%,y%)
1070 c%(c%)+c%(c%)+1
1080 IF board%?k%<0 AND c%(1)+c%(2)=3
THEN PROCnew_cell
1090 IF c%(1)+c%(2)<2 OR c%(1)+c%(2)>
3 THEN new%?k%=0
1100 NEXT
1110 NEXT
1120 FOR i%=0 TO size%*size%-1
1130 board%?i%=new%?i%
1140 NEXT
1150 PROCshow_board
1160 ENDPROC
1170 :
1180 DEF PROCnew_cell
1190 IF c%(1)+c%(2) THEN new%?k%=1 ELSE
new%?k%=2
1200 ENDPROC
1210 :
1220 DEF FNcell(x%,y%)
1230 =board%?((x%+size%) MOD size%+size%
*((y%+size%) MOD size%))
1240 :
1250 DEF PROCshow_board
1260 LOCAL i%
1270 FOR i%=0 TO size%*size%-1
1280 PROCshow_square(i%)
1290 NEXT
1300 ENDPROC
1310 :
1320 DEF PROCshow_square(i%)
1330 LOCAL x%,y%
1340 x%=i% MOD size%
1350 y%=i% DIV size%
1360 VDU 5
1370 GCOL 0,board%?i%
1380 MOVE x%*xs,y%*64+60
1390 PRINT piece$
1400 VDU 4
1410 ENDPROC
1420 :
1430 DEF PROCcentre(t$,y%,c%)
1440 COLOUR c%
1450 PRINTTAB(x%-LEN(t$)/2,y%):t$
1460 ENDPROC
1470 :
1480 DEF PROCgames_won
1490 COLOUR 3
1500 PRINTTAB(0,5)+"Games"
1510 COLOUR 2
1520 FOR player%=1 TO 2
1530 PRINTTAB(0,6+player%);player$(pla
yer%);": ";games(player%);SPC5
1540 NEXT
1550 PRINTTAB(0,10)+"Played : ";game%-1;
" "
1560 PRINTTAB(0,11)+"To play: ";to_play%
-(game%-1);" "
1570 ENDPROC
1580 :
1590 DEF PROCturn(player%,turn%)
1600 LOCAL time%
1610 IF foul%<-1 ENDPROC
1620 time%=TIME
1630 where%=EVAL("FN"+proc$(player%)+"(
board%,player%,turn%,size%,first%,time_l
eft%(player%))")
1640 time_left%(player%)=time_left%(pla
yer%)-(TIME-time%)
1650 IF time_left%(player%)<0 foul%=pla
yer%
1660 IF where%<0 OR where%>size%*size%-
1 foul%=player% ELSE IF board%>where%<0
foul%=player%
1670 IF foul%=-1 THEN board%>where%pla

```

```

yer%:PROCshow_square(where%)
1680 ENDPROC
1690 :
1700 REM >Procs.Best8
1710 :
1720 DEF FNbest(board%,player%,turn%,si
ze%,first%,left%)
1730 LOCAL best_score%,x%,y%,try_x%,try
_y%
1740 IF turn%=-1 DIM best_brd%(size%+1,
size%+1),best_brd2%(size%+1,size%+1),bes
t_c%(2),best_t%(2),best_b%(size%,size%):
=0
1750 FOR x%=0 TO size%-1
1760 FOR y%=0 TO size%-1
1770 best_brd%(x%,y%)=board%?((x%+si
ze%)-1 MOD size%+size%*((y%+size%)-1 MOD
size%))
1780 NEXT
1790 NEXT
1800 best_score%=-9999
1810 FOR x%=1 TO size%
1820 FOR y%=1 TO size%
1830 best_b%(x%,y%)=-10000
1840 NEXT
1850 NEXT
1860 FOR try_x%=1 TO size%
1870 FOR try_y%=1 TO size%
1880 IF best_brd%(try_x%,try_y%)<0 PR
OCbest_try(try_x%,try_y%)
1890 NEXT
1900 NEXT
1910 REPEAT
1920 x%=RND(size%)
1930 y%=RND(size%)
1940 UNTIL best_b%(x%,y%)>best_score%
1950 =(x%-1)+size%*(y%-1)
1960 :
1970 DEF PROCbest_try(try_x%,try_y%)
1980 LOCAL xx%,yy%,xx%,yy%,cc%
1990 FOR x%=0 TO size%-1
2000 FOR y%=0 TO size%-1
2010 best_brd2%(x%,y%)=best_brd%(x%,y
%)
2020 NEXT
2030 NEXT
2040 best_t%(1)=0
2050 best_t%(2)=0
2060 best_brd%(try_x%,try_y%)=player%
2070 FOR x%=1 TO size%
2080 FOR y%=1 TO size%
2090 best_c%(1)=0
2100 best_c%(2)=0
2110 FOR xx%=1 TO 1
2120 FOR yy%=1 TO 1
2130 cc%=best_brd2%(x%+xx%,y%+yy%)
2140 best_c%(cc%)+best_c%(cc%)+1
2150 NEXT
2160 NEXT
2170 cc%=best_brd2%(x%,y%)
2180 best_c%(cc%)+best_c%(cc%)+1
2190 IF best_brd2%(x%,y%)<0 AND best_
c%(1)+best_c%(2)>3 PROCbest_newcell
2200 IF best_brd2%(x%,y%)<0 AND (bes
t_c%(1)+best_c%(2)>2 OR best_c%(1)+best_
c%(2)=3) THEN cc%=best_brd2%(x%,y%):best
_t%(cc%)+best_t%(cc%)+1
2210 NEXT
2220 NEXT
2230 best_b%(try_x%,try_y%)=best_t%(pla
yer%)-best_t%(3-player%)
2240 IF best_b%(try_x%,try_y%)>best_sco
re% best_score%=best_b%(try_x%,try_y%)
2250 ENDPROC
2260 :
2270 DEF PROCbest_newcell
2280 IF best_c%(1)+best_c%(2) THEN best
_t%(1)+best_t%(1)+1 ELSE best_t%(2)+best
_t%(2)+1
2290 ENDPROC
2300 :
2310 REM >Procs.Simple8
2320 :
2330 DEF FNsimple(board%,player%,turn%,
size%,first%,left%)
2340 LOCAL best_score%,x%,y%
2350 IF turn%=-1 DIM simple_c%(2),simpl
e_k%(size%+1,size%+1),simple_brd%(size%+
1,size%+1):=0
2360 FOR x%=0 TO size%-1
2370 FOR y%=0 TO size%-1
2380 simple_brd%(x%,y%)=board%?((x%+s
ize%)-1 MOD size%+size%*((y%+size%)-1 MO
D size%))
2390 NEXT
2400 NEXT
2410 FOR x%=0 TO size%-1
2420 FOR y%=0 TO size%-1
2430 simple_k%(x%,y%)=0
2440 NEXT
2450 NEXT
2460 FOR x%=1 TO size%
2470 FOR y%=1 TO size%
2480 IF simple_brd%(x%,y%)<0 PROCsimp
le_try(try_x%,try_y%) ELSE simple_k%(x%,y%)+100
0
2490 NEXT
2500 NEXT
2510 best_score%=-1
2520 FOR x%=1 TO size%
2530 FOR y%=1 TO size%
2540 IF simple_brd%(x%,y%)<0 AND simp
le_k%(x%,y%)>best_score% best_score%=simpl
e_k%(x%,y%)
2550 NEXT
2560 NEXT
2570 REPEAT
2580 x%=RND(size%)
2590 y%=RND(size%)
2600 UNTIL simple_k%(x%,y%)>best_score%
2610 =(x%-1)+size%*(y%-1)
2620 :
2630 DEF PROCsimple_try(try_x%,try_y%)
2640 LOCAL xx%,yy%,cc%

```


3D GRAPHICS (page 90)

```

2650 simple_c%(i)=0
2660 simple_c%(2)=0
2670 FOR xx%=1 TO 1
2680 FOR yy%=1 TO 1
2690 cc%=simple_brd%(x%*xx%,y%*yy%)
2700 simple_c%(cc%)=simple_c%(cc%)+1

```

```

2710 NEXT
2720 NEXT
2730 cc%=simple_brd%(x%,y%)
2740 simple_c%(cc%)=simple_c%(cc%)-1
2750 IF NOT ((simple_c%(1)=1 AND simple
_c%(2)=1) OR (simple_c%(player%)=2 AND s

```

```

imple_c%(3-player%)=0)) ENDPROC
2760 FOR xx%=1 TO 1
2770 FOR yy%=1 TO 1
2780 simple_k%(x%*xx%,y%*yy%)=simple_
k%(x%*xx%,y%*yy%)+1
2790 NEXT

```

```

2800 NEXT
2810 simple_k%(x%,y%)=simple_k%(x%,y%)-
1
2820 ENDPROC

```

Listing 3DGraphics1

```

10 REM >3Dprocs
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 DEF PROCInit3D
70 max=100
80 DIM key$(max),obj$(max),dat $1000,o
(2),a(2)
90 key$(1)="rem","include","colour","s
urface","object","merge"
100 keywords=6
110 keydef=keywords
120 p=dat
130 max_tri=1000
140 DIM plot_list 32*max_tri
150 DIM plot_p 4*max_tri
160 dist=800
170 zplus=200000
180 ENDPROC
190 :
200 DEF PROCrotate(x,y,z,a,b,c,RETURN
x2,RETURN y2,RETURN z2)
210 x2=x*COSRAD(b/ang_scale)+z*SINRAD(
b/ang_scale)
220 y2=y
230 z2=-x*SINRAD(b/ang_scale)+z*COSRAD
(b/ang_scale)
240 ENDPROC
250 :
260 DEF PROCload(f$)
270 LOCAL in,line,k,i,cur_obj$
280 PRINT>Loading "f$"...
290 in=OPENIN(f$)
300 line=1
310 cur_obj$=""
320 cur_mode=-1
330 scale=10000:REM Units in 1/10mm
340 ang_scale=410000/360:REM angles fr
om 0 to 4FFFF
350 WHILE NOT EOF#in
360 s$=FNstrip(GET$#in)
370 IF ASC(s$)>=48 AND ASC(s$)<=57 TH
EN
380 IF cur_mode<3 THEN
390 PROCerror("Co-ordinates not exp
ected")
400 ELSE
410 FOR i=0 TO 2
420 PROCget_par(s$,p$)
430 ip=VAL(p$)*scale
440 p+=4
450 NEXT
460 surfp+=1
470 ENDF
480 ELSE
490 PROCget_par(s$,p$)
500 IF p$<" THEN
510 IF RIGHTS(p$,1)!=" THEN
520 k=FNIdentify_keyword(LEFT$(p$)
)
530 IF k=-1 THEN
540 PROCerror("Unknown keyword '"
p$+"")
550 ELSE
560 IF k<keywords cur_mode=k
570 CASE k OF
580 WHEN 0:REM rem:
590 WHEN 1:REM include:
600 PROCload(FNfirst_bit(f$)+".
"+FNstrip(s$))
610 WHEN 2:REM colour:
620 cur_col=0
630 FOR i=1 TO 3
640 PROCget_par(s$,p$)
650 cur_col+=VAL(p$)<<(8*i)
660 NEXT
670 WHEN 3:REM surface:
680 surfp=p
690 ip=0
700 p+=4
710 p+=cur_col
720 p+=12
730 WHEN 4:REM object
740 ip=1
750 p+=4
760 cur_obj$=FNstrip(s$)
770 IF FNIdentify_keyword(cur_o
bj$)<-1 THEN
780 PROCerror("'+cur_obj$+"
defined twice")
790 ELSE
800 key$(keydef)=cur_obj$
810 obj$(keydef)=p
820 keydef+=1
830 ENDF
840 cur_col+=FFFFFFF
850 OTHERWISE
860 FOR i=0 TO 2
870 PROCget_par(s$,p$)
880 o(i)=VAL(p$)*scale
890 NEXT
900 FOR i=0 TO 2
910 PROCget_par(s$,p$)
920 a(i)=VAL(p$)*ang_scale
930 NEXT
940 merge=FALSE
950 WHILE s$<"
960 PROCget_par(s$,p$)
970 CASE FNIdentify_keyword(p$)
OF

```

```

980 WHEN 5:merge=TRUE
990 ENDCASE
1000 ENDWHILE
1010 IF merge THEN
1020 PROCmerge(obj$(k),o(i),a(i))
1030 ELSE
1040 ip=k
1050 FOR i=0 TO 2
1060 i(p+=4*i)=o(i)
1070 i(p+=16*i)=a(i)
1080 NEXT
1090 p+=28
1100 ENDF
1110 ENDCASE
1120 ENDF
1130 ENDF
1140 ENDF
1150 ENDF
1160 line+=1
1170 ENDWHILE
1180 ip=-1
1190 p+=4
1200 CLOSE#in
1210 ENDPROC
1220 :
1230 DEF PROCmerge(a,o(),a())
1240 LOCAL do(),da(),i,bytes
1250 DIM do(2),da(2)
1260 WHILE i<-1
1270 IF i=0 OR i=1 THEN
1280 ip=1
1290 na=i4
1300 p+=4
1310 p+=18
1320 p+=12
1330 a+=12
1340 FOR i=1 TO n
1350 PROCrotate(i,a,i4,a18,a(0),a(1)
,a(2),do(0),do(1),do(2))
1360 p+=o(0)+do(0)
1370 p+=o(1)+do(1)
1380 p+=o(2)+do(2)
1390 p+=12
1400 a+=12
1410 NEXT
1420 ELSE
1430 PROCrotate(a,i4,a18,a12,a(0),a(1)
,a(2),do(0),do(1),do(2))
1440 da(0)=a16+a(0)
1450 da(1)=a120+a(1)
1460 da(2)=a124+a(2)
1470 do(0)=+o(0)
1480 do(1)=+o(1)
1490 do(2)=+o(2)
1500 PROCmerge(obj$(i),do(),da())
1510 a+=28
1520 ENDF
1530 ENDWHILE
1540 ENDPROC
1550 :
1560 DEF PROCerror(err$)
1570 PRINT err$ " at line "line;" of "
f$+"
1580 ENDPROC
1590 :
1600 DEF FNfirst_bit(f$)
1610 LOCAL i
1620 i=LEN(f$)+1
1630 REPEAT
1640 i=-1
1650 UNTIL i=1 OR MID$(f$,i,1)!="
1660 =LEFT$(f$,i-1)
1670 :
1680 DEF FNIdentify_keyword(k$)
1690 LOCAL i
1700 i=1
1710 REPEAT
1720 i=-1
1730 UNTIL i=max OR key$(i)=k$
1740 IF i=max THEN i=-1
1750 :
1760 :
1770 DEF PROCget_par(RETURN s$,RETURN p
$)
1780 LOCAL i,c$
1790 s$=FNstrip(s$)
1800 IF s$="" THEN
1810 p$=""
1820 ELSE
1830 i=0
1840 REPEAT
1850 i+=1
1860 c$=MID$(s$,i,1)
1870 UNTIL c$="" OR c$="," OR c$=" "
1880 p$=FNstrip(LEFT$(s$,i-1))
1890 s$=MID$(s$,i+1)
1900 ENDF
1910 ENDPROC
1920 :
1930 DEF FNlc(s$)
1940 LOCAL i,c
1950 FOR i=1 TO LEN(s$)
1960 c=ASC MID$(s$,i)
1970 IF c>=65 AND c<=90 MID$(s$,i)=CHR
$(c-32)
1980 NEXT
1990
2000
2010 DEF FNstrip(s$)
2020 WHILE LEFT$(s$,1)=""
2030 s$=MID$(s$,2)
2040 ENDWHILE
2050 WHILE RIGHT$(s$)=""

```

```

2060 s$=LEFT$(s$)
2070 ENDWHILE
2080 =s$
2090 :
2100 DEF PROCregister_triangle(a,tri(),
ox,oy,oz,alpha,beta,gamma,new_face)
2110 LOCAL x,y,z,x2,y2,z2,i,aa
2120 IF new_face THEN
2130 cur_face=plot_ptr
2140 cur_total+=0
2150 cur_zno=0
2160 cur_face+=0
2170 plot_ptr+=8
2180 plot_p!(4*faces)=cur_face
2190 faces+=1
2200 ENDF
2210 SYS "ColourTrans_ReturnGCOL",a18 T
O iplot_ptr
2220 plot_ptr+=4
2230 FOR i=0 TO 2
2240 aa+=12*12*tri(i)
2250 x=iaa
2260 y=aa14
2270 z=aa18
2280 PROCrotate(x,y,z,alpha,beta,gamma
,x2,y2,z2)
2290 x2+=ox
2300 y2+=oy
2310 z2+=oz
2320 cur_total+=z2
2330 cur_zno+=1
2340 iplot_ptr+=dist*x2/(z2+zplus)
2350 plot_ptr+=4+dist*y2/(z2+zplus)
2360 plot_ptr+=8
2370 NEXT
2380 cur_face+=1
2390 iplot_ptr+=cur_total/cur_zno
2400 triangles+=1
2410 ENDPROC
2420 :
2430 DEF PROCinit_record
2440 max_frames=50
2450 DIM frame_store 250*1024,frame_ptr
(max_frames)
2460 frames=0
2470 fptr=frame_store
2480 ENDPROC
2490 :
2500 DEF PROCrecord_display
2510 SYS "OS HeapSort",faces,plot_p,3
2520 frame_ptr=(frames)-fptr
2530 FOR i=faces-1 TO 0 STEP -1
2540 a=plot_p!(4*i)
2550 na=i4
2560 a+=8
2570 FOR j=0 TO 28*n-1 STEP 4
2580 fptr+=a+j
2590 NEXT
2600 fptr+=28*n
2610 NEXT
2620 i=fptr-1
2630 fptr+=4
2640 frames+=1
2650 ENDPROC
2660 :
2670 DEF PROCplay_back
2680 bank=1
2690 FOR frame=0 TO frames-1
2700 WAIT
2710 SYS 6,112,bank
2720 bank+=3-bank
2730 SYS 6,113,bank
2740 SYS "ColourTrans_SetGCOL",&FB347
0
2750 RECTANGLE FILL -640,-512,1280,512
2760 SYS "ColourTrans_SetGCOL",&FF7FCA
00
2770 RECTANGLE FILL -640,0,1280,512
2780 a=frame_ptr(frame)
2790 WHILE i<-1
2800 GCOL (ia)>>2 TINT (ia AND 3)<<6
2810 MOVE a14,a18
2820 MOVE a12,a16
2830 PLOT 85,a120,a124
2840 a+=28
2850 ENDWHILE
2860 NEXT
2870 ENDPROC

```

```

210 END
220 :
230 DEF PROCrender(obj$,ox,oy,oz,beta)
240 LOCAL a
250 a=obj$(FNIdentify_keyword(obj$))
260 plot_ptr=plot_list
270 triangles=0
280 faces=0
290 PROCrender_obj(a,ox,oy,oz,0,beta,0
)
300 ENDPROC
310 :
320 DEF PROCrender_obj(a,ox,oy,oz,alph
a,beta,gamma)
330 LOCAL n,x2,y2,z2,tri(),new
340 DIM tri(2)
350 WHILE i<-1
360 IF i=0 OR i=1 THEN
370 new=(i=0)
380 na=i4
390 tri(0)=0
400 FOR i=1 TO n-2
410 tri(i)=i
420 tri(2)=i+1
430 PROCregister_triangle(a,tri(),o
x,oy,oz,alpha,beta,gamma,i=1 AND new)
440 NEXT
450 a+=12*(n+1)
460 ELSE
470 PROCrotate(a14,a18,a112,alpha,bet
a,gamma,x2,y2,z2)
480 PROCrender_obj(obj$(i),ox+x2,oy+
y2,oz+z2,alpha+a16,beta+a120,gamma+a124
)
490 a+=28
500 ENDF
510 ENDWHILE
520 ENDPROC

```

Listing 3DGraphics3

```

10 REM >3Ddemo3
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 LIBRARY "3Dprocs"
70 MODE 13
80 OFF
90 PROCInit3D
100 PROCload("objects.world1")
110 PROCfind_flat_objects
120 ORIGIN 640,512
130 PROCinit_record
140 FOR view=0 TO 359 STEP 10
150 PRINTCHR$13"Frame: ";frames;
160 PROCrender("world",0,-60000*(1+CO
SRAD(view)),300000,view*ang_scale)
170 PROCrecord_display
180 NEXT
190 REPEAT
200 PROCplay_back
210 UNTIL FALSE
220 END
230 :
240 DEF PROCfind_flat_objects
250 LOCAL obj
260 DIM is_flat(max)
270 FOR obj=keywords TO keydef-1
280 is_flat(obj)=FNis_flat(obj)
290 NEXT
300 ENDPROC
310 :
320 DEF FNis_flat(obj)
330 LOCAL a,is_flat,i,n
340 is_flat=TRUE
350 a=obj(obj)
360 WHILE i<-1 AND is_flat
370 IF i=0 OR i=1 THEN
380 na=i4
390 FOR i=1 TO n
400 is_flat=is_flat AND a!(12*i+8)=
0
410 NEXT
420 a+=12*(n+1)
430 ELSE
440 is_flat=a!160 AND a!200 AND a!
240 AND FNis_flat(ia)
450 a+=28
460 ENDF
470 ENDWHILE
480 is_flat
490 :
500 DEF PROCrender(obj$,ox,oy,oz,beta)
510 plot_ptr=plot_list
520 triangles=0
530 faces=0
540 PROCrender_obj(FNIdentify_keyword(
obj$),ox,oy,oz,0,beta,0)
550 ENDPROC
560 :
570 DEF PROCrender_obj(obj$,ox,oy,oz,al
pha,beta,gamma)
580 LOCAL n,x2,y2,z2,tri(),new,a,norm_
x,norm_z
590 IF is_flat(obj) THEN
600 norm_x=SINRAD(0+beta/ang_scale)
610 norm_z=COSRAD(0+beta/ang_scale)
620 IF (norm_x*ox)+(norm_z*(oz+plus)
)<0 ENDPROC
630 ENDF
640 DIM tri(2)
650 a=obj(obj)

```

Listing 3DGraphics2

```

10 REM >3Ddemo1
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 LIBRARY "3Dprocs"
70 MODE 13
80 OFF
90 PROCInit3D
100 PROCload("objects.world1")
110 ORIGIN 640,512
120 PROCinit_record
130 FOR view=0 TO 359 STEP 10
140 PRINTCHR$13"Frame: ";frames;
150 PROCrender("world",0,-60000*(1+CO
SRAD(view)),300000,view*ang_scale)
160 PROCrecord_display
170 NEXT
180 REPEAT
190 PROCplay_back
200 UNTIL FALSE

```



```

660 WHILE !a<>-1
670 IF !a=0 OR !a=1 THEN
680 new=(!a=0)
690 n=a!4
700 tri(0)=0
710 FOR i=1 TO n-2
720 tri(i)=i
730 tri(2)=i+1
740 PROCRegister_triangle(a,tri(),o
x,oy,oz,alpha,beta,gamma,i=1 AND new)
750 NEXT
760 a+=12*(n+1)
770 ELSE
780 PROCrotate(a!4,a!8,a!12,alpha,be
ta,gamma,x2,y2,z2)
790 PROCrender_obj(!a,ox+x2,oy+y2,oz
+z2,alpha+a!16,beta+a!20,gamma+a!24)
800 a+=28
810 ENDF
820 ENDWHILE
830 ENDPROC

```

Listing 3DGraphics4

rem: >objects,House

```

object: door
colour: 255,255,255
surface:
0,0,0
2,0,0
2,4,5,0
0,4,5,0
colour: 0,0,0
surface:
0,2,0,0
1,8,0,0
1,8,4,3,0
0,2,4,3,0
object: window
colour: 255,255,255
surface:

```

```

0,0,0
3,0,0
3,3,0
0,3,0
colour: 0,0,0
surface:
0,3,0,3,0
2,7,0,3,0
2,7,2,7,0
0,3,2,7,0

```

object: half_roof

```

colour: 117,21,13
surface:
0,0,0
2,3,5
0,0,10

```

surface:

```

0,0,0
2,3,5
13,3,5
15,0,0

```

object: endwall

colour: 168,136,98

surface:

```

0,0,0
10,0,0
10,10,0
0,10,0
door: 4,0,0 0,0,0 merge

```

object: sidewall

colour: 168,136,98

surface:

```

0,0,0 0,0,0

```

```

15,0,0 0,0,0
15,10,0 0,0,0
0,10,0 0,0,0
window: 1,6,0 0,0,0 merge
window: 6,6,0 0,0,0 merge
window: 1,1,0 0,0,0 merge
window: 11,1,0 0,0,0 merge
window: 11,6,0 0,0,0 merge
door: 6,5,0,0 0,0,0 merge

```

object: house

```

sidewall: 0,0,0 0,0,0
sidewall: 15,0,10 0,180,0
endwall: 15,0,0 0,270,0
endwall: 0,0,10 0,90,0
half_roof: 0,10,0 0,0,0
half_roof: 15,10,10 0,180,0

```

Listing 3DGraphics5

rem: >objects.world1

include: house

object: world

```

house: -7.5,0,-5 0,0,0
house: 10,0,-15 0,45,0
house: -27,0,-10 0,60,0

```

Listing 3DGraphics6

```

10 REM >PerspDemo
20 REM By Dave Acton
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 0
70 OFF
80 ORIGIN 640,512
90 PROCinit
100 bank=1
110 MOUSE TO 0,0
120 REPEAT
130 FOR ang=0 TO 359 STEP 5

```

```

140 WAIT
150 SYS "OS_Byte",112,bank
160 bank=3-bank
170 SYS "OS_Byte",113,bank
180 CUS
190 MOUSE mx,my,mz
200 zoff=30*my/10
210 IF zoff=0 zoff=1
220 d=mx*800
230 PRINT"d=";d;"zoff=";zoff
240 PROCshow(ang)
250 NEXT
260 UNTIL FALSE
270 END
280 :
290 DEF PROCinit
300 DIM vert(7,2)
310 FOR v=0 TO 7
320 vert(v,0)=(v AND 1)-0.5
330 vert(v,1)=(v AND 2)>>1-0.5
340 vert(v,2)=(v AND 4)>>2-0.5
350 NEXT
360 ENDPROC
370 :
380 DEF PROCshow(ang)
390 FOR v=0 TO 3
400 PROCdraw(v,v+4,ang)
410 PROCdraw(2*v,2*v+1,ang)
420 NEXT
430 PROCdraw(0,2,ang)
440 PROCdraw(1,3,ang)
450 PROCdraw(4,6,ang)
460 PROCdraw(5,7,ang)
470 ENDPROC
480 :
490 DEF PROCdraw(v0,v1,ang)
500 PROCplot(4,v0,ang)
510 PROCplot(5,v1,ang)
520 ENDPROC
530 :
540 DEF PROCplot(code,v,ang)
550 LOCAL x2,y2,z2
560 x2=vert(v,0)*COSRAD(ang)+vert(v,2)
570 y2=vert(v,1)
580 z2=-vert(v,0)*SINRAD(ang)+vert(v,2)
590 PLOT code,d*x2/(z2+zoff),d*y2/(z2+zoff)
600 ENDPROC

```

ASSEMBLY LINE (page 105)

Listing Arm1

```

10 REM >Arm1
20 REM By Dave Lawrence
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 bits=8
70 mult=1<bits
80 :
90 DIM code 1000
100 link=14:pc=15
110 FOR pass=0 TO 2 STEP 2
120 P%code
130 [OPT pass
140 MUL R0,R1,R0
150 MOV R0,R0,ASR #bits
160 MOV pc,link
170 ]
180 NEXT
190 REPEAT
200 INPUT "Two numbers: "A,B
210 A%=A*mult
220 B%=B*mult
230 PRINT USR(code)/mult,A*B
240 UNTIL FALSE

```

Listing Arm2

```

10 REM >Arm2
20 REM Divide routine
30 REM By Dave Lawrence
40 REM For 32-bit machines
50 REM (c) BAU June 1993
60 :
70 DIM code 1000
80 top=0
90 bot=1
100 result=2
110 sign=3
120 bit=4
130 sp=13
140 link=14
150 pc=15
160 FOR pass=0 TO 2 STEP 2:P%code
170 [OPT pass
180 :divide
190 STMPD (sp)!,(result ,sign
,bit)
200 MOV result,#0
210 MOV bit,#1
220 EOR sign,top,bot
230 CMP bot,#0
240 RSRMI bot,bot,#0
250 CMP top,#0
260 RSRMI top,top,#0
270 CMP top,#2^24
280 BLT skip1
290 FNDiv(31)
300 FNDiv(30)
310 FNDiv(29)
320 FNDiv(28)
330 FNDiv(27)
340 FNDiv(26)
350 FNDiv(25)
360 .skip1

```

```

370 CMP top,#2^16
380 BLT skip2
390 FNDiv(24)
400 FNDiv(23)
410 FNDiv(22)
420 FNDiv(21)
430 FNDiv(20)
440 FNDiv(19)
450 FNDiv(18)
460 FNDiv(17)
470 .skip2
480 CMP top,#2^8
490 BLT skip3
500 FNDiv(16)
510 FNDiv(15)
520 FNDiv(14)
530 FNDiv(13)
540 FNDiv(12)
550 FNDiv(11)
560 FNDiv(10)
570 FNDiv(9)
580 FNDiv(8)
590 .skip3
600 FNDiv(7)
610 FNDiv(6)
620 FNDiv(5)
630 FNDiv(4)
640 FNDiv(3)
650 FNDiv(2)
660 FNDiv(1)
670 FNDiv(0)
680 .donediv
690 MOV top,result
700 CMP sign,#0
710 RSRMI top,top,#0
720 LDMFD (sp)!,(result ,sign
,bit)
730
740 MOV pc,link
750 ]NEXT
760 REPEAT
770 INPUT "Two numbers "A,B%
780 PRINT USR(code),A% DIV B%
790 UNTIL FALSE
800 :
810 DEF FNDiv(it)
820 IF it>0 THEN
830 [OPT pass
840 CMP bot,top,LSR #it
850 ORRLR result,result,bit,ASL #it
860 SUBLE top,top,bot,ASL #it
870 ]
880 ELSE
890 [OPT pass
900 CMP bot,top
910 ORRLR result,result,#1
920 SUBLE top,top,bot
930 ]
940 ENDF
950 =""

```

Listing Arm3

```

10 REM >Arm3
20 REM Square root
30 REM By Dave Lawrence
40 REM For 32-bit machines

```

```

50 REM (c) BAU June 1993
60 :
70 DIM code 1000
80 x=0:a!1=c:2:sum=3
90 link=14:pc=15
100 FOR pass=0 TO 2 STEP 2:P%code
110 [OPT pass
120 .sqr
130 MOV a,#1
140 MOV c,#0
150 B cmp
160 .loop
170 MOV a,a,ASL #2
180 .cmp
190 CMP a,x
200 BLT loop
210 .loop2
220 ADD sum,a,c
230 MOV c,c,LSR #1
240 CMP x,sum
250 SUBGE x,x,sum
260 ADDGE c,c,a
270 MOVS a,a,LSR #2
280 BNE loop2
290
300 CMP c,x
310 ADDLT R0,c,#1
320 MOVGE R0,c
330
340 MOV pc,link
350 ]NEXT
360 FOR A%=1 TO 8000
370 PRINT A%,USR(sqr),INT(SQR(A%)*.5)
380 NEXT

```

Listing Arm4

```

10 REM >Arm4
20 REM By Dave Lawrence
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 0:OFF
70 :
80 sp=13:link=14:pc=15
90 DIM code 100
100 FOR pass=0 TO 2 STEP 2
110 P%code
120 [OPT pass
130 .rand
140 LDR R0,Aseed
150 LDR R1,Axor
160 MOVS R0,R0,LSL #1
170 EORCS R0,R0,R1
180 STR R0,Aseed
190
200 MOVCC R0,#0
210 MOVCS R0,#1
220
230 MOV pc,link
240
250 .Aseed EQU TIME
260 .Axor EQU &1D872B41
270 ]
280 NEXT
290 REPEAT
300 FOR y=255 TO 0 STEP -1

```

Listing Arm5

```

10 REM >Arm5
20 REM By Dave Lawrence
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 MODE 9:OFF
70 FOR c=1 TO 15
80 COLOUR c,RND,RND,RND
90 NEXT
100 DIM code 200
110 FOR pass=0 TO 2 STEP 2:P%code
120 [OPT pass
130 LDR R0,seed
140 LDR R1,c1
150 LDR R2,c2
160 MLA R0,R1,R0,R2
170 MLA R3,R1,R0,R2
180 STR R3,seed
190 EOR R0,R0,R3,ROR #16
200 MOV PC,R14
210
220 .c1 EQU D 1664525
230 .c2 EQU D 907633393
240 .seed EQU TIME
250 ]NEXT
260 REPEAT
270 rnd=USR(code)
280 GCOL USR(code) AND 15
290 POINT (USR(code) AND 255)*4,(USR(
code) AND 255)*4
300 UNTIL 0

```

Listing Arm6

```

10 REM >Arm6
20 REM By Dave Lawrence
30 REM For 32-bit machines
40 REM (c) BAU June 1993
50 :
60 DIM code 200
70 link=14:pc=15
80 FOR pass=0 TO 2 STEP 2:P%code
90 [OPT pass
100 MOVS R0,#0
110
120
130 MOV R0,PC,LSR #28
140 MOV pc,link
150
160 ]NEXT
170 bits=USR(code)
180 IF bits AND 8 PRINT"N ";
190 IF bits AND 4 PRINT"Z ";
200 IF bits AND 2 PRINT"C ";
210 IF bits AND 1 PRINT"V ";
220 IF bits=0 PRINT"Nothing" ELSE PRIN
T

```


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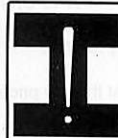
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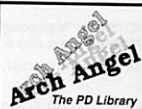
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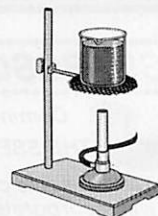
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THE MOXON INTERVIEW

DOMINIK DIAMOND

I have to admit, I was expecting something different. Dominik Diamond, presenter of Channel Four's cult *GamesMaster* programme, looks far more human over a pint of lager top than he does on his weekly TV spot.

He's just spent a hectic day hosting the *Acorn User* show in Harrogate and he seems pretty enthusiastic.

'I have to say I'm genuinely impressed by the standard and amount of games available for the Archimedes,' he says.

'Let's face it: the new products for the consoles this year have been absolute rubbish, and the Acorn world has got so much more good stuff coming out. And it's so refreshing to see that there aren't loads of boring licence tie-ins, but plenty of original games around.'

That may be the case but, as most viewers know, *GamesMaster* is not renowned for its coverage of Acorn games.

'Most of the coverage I deal with is concerned with Sega, Nintendo and Commodore, simply because of the volume of the markets. Before today I wasn't aware of the amount of original software on the Acorn; the market's just like the Amiga was five years ago. If Acorn can jump five years in one year, they will become really serious competitors.'

'Acorn will do so well because its image is good with parents. What it needs now is more and more games – the serious products are already there – and more publicity in multi-format titles.'

'The games in the Acorn market are of a very high quality, as only the best conversions have been made; Krisalis, for example, hasn't produced one turkey for the Arc. The *Lotus Turbo Challenge* conversion is absolutely brilliant.'

'More and more games will drive the market and get the coverage.'



So how exactly should Acorn leap five years?

'The problem with Acorn is that it is identified with school, which is fine in itself but causes hassle with third-party developers. I can't see hip programmers like the Bitmap Brothers releasing an Arc game at the same time as the other formats, simply because the Arc doesn't have the cred. Acorn should look at Sega and copy its marketing strategy; the MegaDrive is a pretty poor machine compared to its rivals, but it's been marketed so well, it's selling in ridiculous numbers.'

'It's all down to marketing. The games are appearing, and I saw some excellent original software at the show, like *Microdrive* and *Spheres of Chaos* – the potential is huge. Another bonus is that the Acorn games market is so cheap compared to consoles. You can pick up a really decent game for very little.'

'However, the Arc's good in other areas too, like the video recording and editing with *Replay*. The Sega MegaCD has nothing on this, it's really block and grainy. *Replay* really adds to games, and that should be exploited. On the other hand, just adding video doesn't necessarily make a good game; you still need decent gameplay.'

Of course, the one to watch at the moment is 3DO, the new games console based on the Arm chip.

'3DO is the bees knees. Programmers are moving away from the Amiga market towards consoles because the A1200 is too little too late, and everyone who has seen the 3DO in action has come away drooling. Looks good for Acorn, if you ask me.'

So can we expect to see more Arcs on *GamesMaster*?

'Yes. If the games start to appear and we've not covered them before, I think you can.'

NEXT MONTH

● Hard drives come under our scrutiny next month, with a special look at those familiar problems of backup routines and data security.

Find out about a brand new application which not only allows you to partition your hard disc but can also hide certain areas of the disc from public view. Also, we will be testing out the latest application to make selective backups a far easier affair. But what is the best device to backup onto? We look at some of the options from the floppy to the tape-streamer to the magneto-optical drive.

● Have you ever taken a really close look at the icons that grace your *Acorn User* subscriber's disc? Ever wondered how we manage to pack so much artistry into such a tiny space?

Next month all will become clear as Jack Kreindler, *Acorn User*'s icon expert, shares the secrets of miniature design.

● Delve into the bargain basement of the software world. Public domain programs come to the pages of *Acorn User*.

● *UltiMode*, our ultra-quick utility, allows you to change screen mode in the desktop by simply pressing a key. Never again need you endure the long-winded task of mode changing.

UltiMode is available in our yellow pages, and of course on the monthly subscriber's disc. Begone dull palette menu.

● Next month the *Acorn User* team take a trip down to the local pub, play the entire population of a village at an adventure game called *Atavar* and much more besides. It's all going on at The Silicon Village...

● Confused by debugging? Can't get to grips with Basic commands? Don't know your bits from your bytes? If so, you need our new programming series.

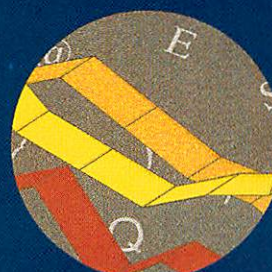
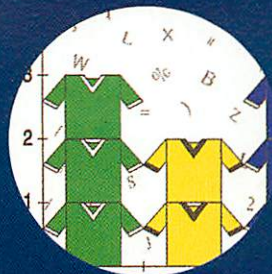
All you ever wanted to know about Basic programming but were afraid to ask... Don't miss part one.

● Plus all the latest news on hardware, software, graphics and education. Next month's issue is in the shops on 10 June.

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| Last page completed - ARM3 | 316 | 200 | 1.6 |
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